EFFECT OF DRY COLD APPLICATION ON PAIN PERCEPTION AND ECCHYMOSIS AMONG PATIENTS RECEIVING LOW MOLECULAR WEIGHT HEPARIN AT SELECTED HOSPITAL, COIMBATORE

SHIJILA. S

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Award of the Degree of

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This is to certify that the dissertation entitled **"Effect of Dry Cold Application on Pain Perception and Ecchymosis among Patients Receiving Low Molecular Weight Heparin at Selected Hospital, Coimbatore"** is a bonafide work done by **Shijila. S, College of Nursing, Sri Ramakrishna Institute of Paramedical Sciences** in partial fulfillment of the University rules and regulations for award of **M.Sc. Nursing Degree** under my guidance and supervision during the academic year **2016.**

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EFFECT OF DRY COLD APPLICATION ON PAIN PERCEPTION AND ECCHYMOSIS AMONG PATIENTS RECEIVING LOW MOLECULAR WEIGHT HEPARIN AT SELECTED HOSPITAL, COIMBATORE

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SUMMARY AND CONCLUSION

This chapter summarizes the major findings, limitations and implications in the field of nursing education, nursing practice, nursing administration, nursing research and recommendations for further research.

The main aim of the study was to assess the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin. The dry cold application is an effective method in reducing pain perception and ecchymosis.

The proposed conceptual framework for the present study was Widen Bach's helping art of clinical nursing theory. Review of literature brought out many facts about effect of dry cold application among patients receiving low molecular weight heparin. The post test only control group design was used for the study.

The study was conducted in Sri Ramakrishna Hospital, Coimbatore. Total enumerative sampling technique was used to select the samples were randomly assigned to experimental group (n=13) and the control group (n=12). Dry cold application was given for 3 minutes on the LMWH injection site for the experimental group. Injection LMWH was administered subcutaneously to the experimental group and control group. The level of pain perception was assessed using numerical pain rating scale and the ecchymosis was assessed by using transparent ruler scale. Unpaired 't' test was used to find out the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin. The findings of the study concluded that the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin.

6. 1 Major Findings of the Study

6.1.1 The majority of patients both 9 (69.23%) in experimental group and 8 (66.67%) in control group were in the age group of above 51 years.

6.1.2 In the experimental group majority, 10 (76.92%) patients were males. In the control group 6 (50%) patients were males and females respectively.

6.1.3 The majority of patients both 6 (46.15%) in experimental group and 5 (41.67%) in control group had high school education.

6.1.4 The majority of patients both 11 (84.62%) in experimental group and 9 (75%) in control group were married.

6.1.5 The majority of patients both 13 (100%) in experimental group and 10 (83.33%) in control group belonged to Hindu religion.

6.1.6 In the experimental group majority, 9 (69.23%) patients were employed. In the control group 6 (50%) patients were employed and 6 (50%) patients were unemployed respectively.

6.1.7 The majority of patients both 10 (76.92%) in experimental group and 8 (66.67 %) in control group were diagnosed with CVA.

6.1.8 The majority of patients both 8 (61.53%) in experimental group and 8 (66.67%) in control group received Inj. Flothin 40 mg.

6.1.9 All patients in the experimental and control group, received inj. LMWH twice a day.

6.1.10 In the experimental group majority, 10 (76.92%) patients had other illness. In the control group 6 (50%) patients had other illness, 6 (50%) patients had no other illness such as DM, SHT, CCF, CRF, PVD etc.

6.1.11 Level of pain perception among patients receiving LMWH on right upper outer arm shows that in experimental group immediately after withdrawing needle, 13 (100%) patients had mild pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in the control group immediately after withdrawing needle 8 (66.67%) patients had moderate pain, after 4 hours, 8 (66.67%) patients had mild pain, and after 8 hours 6 (50%) patients had no pain and mild pain respectively.

6.1.12 Level of pain perception among patients receiving LMWH on left upper outer arm reveals that in experimental group immediately after withdrawing needle 12 (92.31%) patients had mild pain, after 4 hours and 8 hours 13 (100%) of patients had no pain respectively, whereas in control group immediately after withdrawing needle 8 (66.67%) patients had moderate pain, after 4 hours, 10 (83.33%) patients had mild pain, and after 8 hours 7 (58.33%) patients had no pain.

6.1.13 Level of pain perception among patients receiving LMWH on right thigh shows that in experimental group immediately after withdrawing needle, 7 (53.85%) patients had mild pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in control group immediately after withdrawing needle 10 (83.33%) patients had moderate pain, after 4 hours, 7 (58.33%) patients had mild pain, and after 8 hours 9 (75%) patients had no pain.

6.1.14 Level of pain perception among patients receiving LMWH on left thigh shows that in experimental group immediately after withdrawing needle, 8 (61.54%) patients had mild pain, after 4 hours and 8 hours 13 (100%) patients had mild pain respectively, whereas in control group immediately after withdrawing needle 6 (50%) patients had moderate pain and severe pain respectively, after 4 hours, 10 (83.33%) patients had mild pain, and after 8 hours 7 (58.33%) patients had no pain.

6.1.15 Size of ecchymosis among patients receiving LMWH on right upper outer arm reveals that in the experimental group after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2, whereas in the control group after 48 hours, 9 (75%) patients had ecchymosis measuring 0-0.5 cm^2, and after 72 hours, 8 (66.67%) patients had ecchymosis measuring 0-0.5 cm^2.

6.1.16 Size of ecchymosis among patients receiving LMWH on left upper outer arm reveals that in the experimental group after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2, whereas in the control group after 48 hours, 10 (83.34%) patients had ecchymosis measuring 0-0.5 cm^2, and after 72 hours, 8 (66.67%) patients had ecchymosis measuring 0-0.5 cm^2.

6.1.17 Size of ecchymosis among patients receiving LMWH on right and left thigh reveals that in the experimental and control group, after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2.

6.1.18 Effect of dry cold application on pain perception, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 0.439 and 0.555 respectively and control group was 1.861 and 2.155 respectively with the mean difference of 1.422. Calculated 't' value was 2.205, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Pain perception assessed after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group 0.294 and 0.359 respectively with the mean difference of 0.294. Calculated 't' value was 2.827, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Pain perception assessed after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and the control group was 0.099 and 0.119 respectively with the mean difference of 0.099. Calculated 't' value was 2.912, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH in immediately after withdrawing needle, after 4 hours and after 8 hours in the experimental and control group. Thus the research hypothesis H_1: There will be a significant difference in the level of pain perception between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin is accepted.

6.1.19 Effect of dry cold application on ecchymosis, 48 hours after the day of injection, it was identified that, the mean score and the standard deviation of experimental group was 0.003 and 0 respectively and control group was 0.069 and 0.108 respectively with the mean difference of 0.066. Calculated 't' value was 2.129, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Ecchymosis assessed 72 hours after the day of injection, it was identified that, the mean score and the standard deviation of experimental group was 0.001 and 0 and control group was 0.109 and 0.175 respectively with the mean difference of 0.108. Calculated 't' value was 2.118, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH in 48 hours and 72 hours after the day of injection. Thus the research hypothesis H_2: There will be a significant difference in the size of ecchymosis between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin is accepted.

6.2 Limitation

6.2.1 Generalization was not possible due to small sample size (n=25).

6.2.2 The second dose ecchymosis could not be assessed in the right and left thigh because the patients were discharged after 5 days.

6.3 Recommendations

6.3.1 The similar study can be undertaken with large samples to show strong statistical association.

6.3.2 A similar study can be conducted among the patients receiving various routes of injections such intramuscular, intravenous and intradermal.

6.3.3 A comparative study can be conducted to assess the level of pain and ecchymosis among patients receiving low molecular weight heparin before and after of dry cold application.

6.3.4 All staff nurses have to be trained to implement the dry cold application before administering LMWH to reduce the level of pain perception and ecchymosis.

6.4 Nursing implications

The finding of the study has several implications for nursing education, nursing administration, nursing practice and nursing research.

6.4.1 Nursing education

Nursing students should be educated on recent practice and trends of administration of low molecular weight heparin. Nursing curriculum should be equipped with knowledge and skill to prepare efficient nurses to provide quality nursing care.

6.4.2 Nursing administration

The nurse administrator should look into the need for organizing in-service and continuing nursing education programs for staff nurses in order to update their knowledge regarding the use of dry cold application. Nursing administrators can introduce dry cold application as an evidenced based practice protocol. Nurse administrators should communicate this knowledge to the clinical staff and ensure practice of dry cold application for patients getting LMWH.

6.4.3 Nursing practice

Nurses play a vital role in the health care delivery system, who works in the immediate environment with the patients and has all the opportunity to identify the need and problems. Result of the present study strongly recommended that dry cold application was effective on pain perception and ecchymosis. Hence the nurses should be trained for dry cold application prior to administration of injection low molecular weight heparin to reduce pain perception and ecchymosis.

6.4.4 Nursing research

Selected measures can be applied to reduce the pain perception and ecchymosis after administration of injection LMWH. Hence nurse researcher should focus on well-designed clinical trials on pain perception and ecchymosis after administering various injections in various settings. The finding of the present study is helpful for the nursing professionals to conduct further studies to find out the effectiveness of various techniques and therapies on pain perception and ecchymosis. It adds valuable knowledge which can be used as evidence based practice.

6.5 Conclusion

The patients receiving LMWH experienced pain and develop ecchymosis. The study was conducted to find the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin. Dry cold application prior to administration of LMWH has shown to reduce pain perception and ecchymosis. Therefore the dry cold can be used as a measure in reducing injection LMWH induced pain perception and ecchymosis. This study proves that the dry cold application is effective in reducing pain perception and ecchymosis among patients receiving low molecular weight heparin.

REFERENCES

1. Akpinar, R. B., & Calebioglu, A. (2008). Effect of injection duration on bruising associated with subcutaneous heparin. *International Journal of Nursing*, 45(6), 812-817. Retrieved from website: http://www.researchgate.net/publication/51381631

2. Arizona state university. (2013). *Wellness*. Retrieved from website: http://pnwf.org/html/health

3. Avsar. G., & Kasikci, M. (2013). Assessment of four different methods in subcutaneous heparin administration with regard to causing bruise and pain. *International Journal of Nursing Practice*, 19(4), 402-408. Retrieved from website: http://www.researchgate.net/publication/255691913

4. Batra, G. (2014). Application of ice cube prior to subcutaneous injection of heparin in pain perception and ecchymosis of patients with cardiovascular problems. *The Nursing Journal of India*, 4, 155-159. Retrieved from website: http://www.unboundmedicine.com/medline/25799797

5. Caplan, L. R. (2015). *Ischemic Stroke Treatment*. Retrieved from website: http://www.uptodate.com/contents/ischemic-stroke

6. Chan, H. (2001). Effect of injection duration on site-pain intensity and bruising associated with subcutaneous heparin. *Journal of Advanced Nursing*. 35(6), 882-92. Retrieved from website: http://www.researchgate.net/publications/11792774

7. Chenicek, T. E. (2004). *Effects of Injection Duration on Site-Pain Intensity and Bruising Associated with Subcutaneous Administration of Lovenox (Enoxaparin Sodium)*. Retrieved from website: http://diginole.lib.fsu.edu/etd/3825

8. Chiou-Tan, F. Y., Garza, H., & Chan, K.T. (2003). *Comparison of Dalteparin and Enoxaparin for Deep Venous Thrombosis Prophylaxis in Patients with Spinal Cord Injury*. Retrieved from website: http://www.journals.lww.com/2003

9. Cruz-Flores, S. (2015). *Stroke Anticoagulation and Prophylaxis*. Retrieved from website: http://emedicine.medscape.com/article/1160021

10. Dadaeen, A., Bahreini, M., Bazi, P., Ostovar, A., Raeisi, A. & Dobaradaran, S. (2015). Effect of duration of subcutaneous injection on the extent of bruising and pain intensity at injection sites. *International Cardiovascular Research Journal*, 9(2), 77-82 Retrieved from website: http://www.ircrj.com

11. Demarin, V., Morovic, S., & Rundek, T. (2013). *Current Trends in Stroke Management*. Retrieved from website: http://www.strokemanagement.com

12. Devi, G. S. (2009). *Effectiveness of Self-Instructional Module on Knowledge of Life Style Modification among Stroke Patients*. Retrieved from website: http://www.rguhs.ac.in/14587.doc

13. Ebner, C.A. (1996). Cold therapy decrease the perceived pain associated with intramuscular injection. *Comprehensive Paediatric Nursing*, 19, 197–208.

14. Fathi, R., Imanipour, M., Pasheypoor, Sh., & Nasrabadi, N. A. (2014). Compare the effects of air locks and duration of pain and bruising caused by the subcutaneous heparin injection. *Iranian Journal of Nursing Research,* Retrieved from website: http://www.ijnr.ir/browse.php/1398

15. George, J. (2008). *Effectiveness of Ice Cube as an Anesthetic Pretreatment for Intradermal Injection*. Retrieved from website: www.rguhs.ac.in/6934

16. Gourie-Devi, M. (2008). Organization of neurology services in India. *Neurology India*, 56(1), 4-12. Retrieved from website: http://www.neurologyindia.com/0028

17. Gowan, S., & Wood, S. (1990). Evaluate techniques used for administering heparin subcutaneously on bruising at the injection site. *The Australian Journal of Advanced Nursing,* 7(2), 30-39. Retrieved from website: http://www.researchgate.net/publications/20776795

18. Hadley, S.A., Chang, M., & Rogers, K. (1996). Effect of syringe size on bruising following subcutaneous injection. *American Journal of Critical Care*, 5(4), 271-276. Retrieved from website: http://www.ncbi.nlm.nih.gov/pubmed/8911149

19. Hasanpour, M., Tootoonchi, M., Aein, F., & Yadegarfar, G. (2006). *The Effects of Two Non-Pharmacologic Pain Management Methods for Intramuscular Injection Pain.* Retrieved from website: http://www.sciencedirect.com/science/27983

20. Jamula, E., Woods, K., Verhovsek, M., Douketis, J. D., & Donald, E. (2009). Comparison of pain and ecchymosis with low-molecular-weight heparin vs. unfractionated heparin in patients requiring bridging anticoagulation after warfarin. *Journal of Thrombosis and Thrombolysis*, 28(3), 266-268. Retrieved from website: http://www.ncbi.nlm.nih.gov/pubmed/19219405

21. John, S. (2013). *Effect of Time Duration in Injecting Subcutaneous Heparin on Pain and Bruising*. Retrieved from website: www.rguhs.ac.in/46128

22. Kalafut, M. A., Gandhi, R., Kidwell, C. S., & Saver, J. L. (2000). Safety and cost of low-molecular-weight heparin as bridging anticoagulant therapy in subacute cerebral ischemia. *American Heart and Stroke Association Journals*, 31(11), 2563-2568. Retrieved from website: http://www.researchgate.net/publication/12265202

23. Klingman, L. (2000). Effects of changing needles prior to administering heparin subcutaneously. *Heart and Lung the Journal of Acute and Critical Care*, 29(1), 70-75. Retrieved from website: http://www.researchgate.net/publication/12677440

24. Kozier, B., Erb, G., Berman, A., & Burke, K. (2007). *Fundamentals of nursing: Concepts process and practice* (7th ed.). South Asia: Dorling Kindersley.

25. Kuzu, N., & Ucar, H. (2001). Effect of local dry cold application on the occurrence of bruising, haematoma and pain at the injection site of subcutaneous low molecular weight heparin injections. *International Journal of Nursing Studies*, 38(1), 51-59. Retrieved from website: http://www.researchgate.net/publication/12190938

26. Length and Width to Area calculator. (2016). Retrieved from website: http://www.sensorsone.com/length-and-width-to-area-calculator

27. Lewis, S. L., Heitkemper, M. M., & Chintamani. (2015). *Medical surgical nursing: Assessment and management of clinical problems*. (2nd South Asia ed.). India: Elsevier.

28. Masand, P. (2013). *3 Indians Suffer a Stroke Every Minute*. Retrieved from website: http://timesofindia.indiatimes.com/home/science/24308164

29. Melba, C., & Priyalatha. (2009). Effect of dry cold application on the occurrence of bruising and pain at the subcutaneous injection site of LMWH. *Asian Journal of Cardiovascular Nursing*, 22, 10-15.

30. Merriam-Webster. (2015). *Medical Definition of Ecchymosis.* Retrieved from website: http://www.merriam-webster.com/medical/ecchymosis

31. Micromedex. (2014). *Clexane Side Effects*. Retrieved from website: http://www.drugs.com/druginformation

32. Nair, P., Kaur, S., & Sharma, P. Y. (2008). Effect of time taken in injecting subcutaneous heparin injection with reference to site pain and bruising. *Nursing and Midwifery Research Journal*, 4(1), 7-12.

33. Nancy. (2012). *Stephanie's principles and practice of nursing: Nursing arts procedures*. (6th ed.). Indore: N. R. publishing house.

34. National Library of Medicine. (2014). *Low Molecular Weight Heparin.* Retrieved from website: http://www.nlm.nih.gov/2011

35. National Wellness Institute. (2013). *Definition of Health/ Wellness*. Retrieved from website: http://pnwf.org/health

36. Neshat, T. B., Fooroozi, A. M., & Alizadeh, M. S. (2005). Relation between duration of injection of subcutaneous heparin and extent of local skin discoloration. *The Journal of Shahid Sadoughi University of Medical Sciences*, 12(4), 86-94. Retrieved from website: http://jssu.ssu.ac.ir/8732549

37. Neurol, A., Wang, Q., Chen, C., Han, J. H., Soo, Y., Wong, K. S., et al. (2012). *The Low-Molecular-Weight Heparin and Early Neurologic Deterioration in Acute Stroke Caused By Large Artery Occlusive Disease*. Retrieved from website: http://www.ncbi.nlm.nih.gov/22893265

38. Palesa, A., & Aidone, E. (2012). Occurrence and extent of bruising according to duration of administration of subcutaneous low molecular weight heparin. *Journal of Cardiovascular Nursing,* 20, 1-9.

39. Pamela, J. (2005). *Lippincott's textbook for nursing assistants* (6th ed.). Lippincott Williams and Wilkins publishers.

40. Park, K. (2015). *Textbook of preventive and social medicine* (23rd ed.). India: Banarsidas Bhanot.

41. Polit, D. F., & Beck, C. T. (2013). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). New Delhi: Wolters Kluwer.

42. Pushpa., Intrajit, W., Yash, S. P., & Sukhpal, K. (2008). Prevention and reduction of pain, bruise and hematoma by moist ice pack application on the subcutaneous heparin injection. *Nursing Times*, 32(6), 4-8.

43. Rau, T. M. (2013). *Illness.* Paracelsus clinic. Retrieved from website: http://pnwf.org/rau

44. Ross, S., & Soltes, D. (1995). Effect of ice application to the site of subcutaneous heparin injection decreases the incidence and size of haematoma formation and minimizes the level of patient discomfort. *Journal of Advanced Nursing*, 21(3), 434-439. Retrieved from website: http://www.researchgate.net/publication/15454386

45. Sari, A. A., Janani, L., Mohammady, M., & Nedjat, S. (2014). *Slow Versus Fast Subcutaneous Heparin Injections for Prevention of Bruising and Site-Pain Intensity.* The cochrane database of systematic reviews. Retrieved from website: http://www.unboundmedicine.com/medline/citation/25036897

46. Sendir, M., Buyukyilmaz, F., Celik, Z., & taskopru, I. (2015). Comparison of 3 methods to prevent pain and bruising after subcutaneous heparin administration. *Clinical Nurse Specialist Journal*, 29(3), 174-180. Retrieved from website: https://www.researchgate.net/publication/274725332

47. Sharma, S. K. (2012). *Nursing research and statistics*. India: Elsevier.

48. Sheikh, I. (2010). *Effectiveness of Ice Cube Application in Reducing Pain before Giving Intra Muscular Injection*. Retrieved from website: www.rguhs.ac.in

49. Skidmore-Roth, L. (2009). *Mosby's nursing drug reference*. India: Elsevier.

50. Suddarth & Brunner. (2014). *Textbook of medical-surgical nursing* (13th ed.). New Delhi: Wolters Kluwer.

51. Sunny, S. (2010). *Effectiveness of Local Cold Application on Pain Response during Intravenous Procedures*. Retrieved from website: www.rguhs.ac.in

52. United National Report. (2007). *Neurological Disorders*. Retrieved from website: http://www.un.org/21689

53. Varghese, C., Indarjit, W., Sharma, Y. P., & Kaur, S. (2006). Effect of moist ice pack application to the prevention and reduction of pain, bruise and hematoma on the site of subcutaneous heparin injection. *Nursing and Midwifery Research Journal,* 2(4), 139-148. Retrieved from website: http://www.ncbi.nlm.nih.gov/pubmed/22893265

54. Webster, S. (1913). *Dictionary Definition of Health*. Retrieved from website: http://pnwf.org/health

55. Wooldridge, J. B., & Jackson, J. G. (1998). Evaluation of bruises and areas of induration after two techniques of subcutaneous heparin injection. *Heart and Lung the Journal of Acute and Critical Care,* 17(5), 476-482. Retrieved from website: http://www.researchgate.net/publication/19737795

56. Yagiz, E. (2006). Cold application for the treatment of pain. *Agri J Turk Soc Alogology,* 18(2), 5-14.

57. Zaybak, A., & Khorshid, L. (2008). Effect of the duration of subcutaneous heparin injection on bruising and pain. *Journal of Clinical Nursing*, 17(3), 378-385. Retrieved from website: http://www.ncbi.nlm.nih.gov/17931375

58. Zeraatkari, K., Karimi, M., Shahrzad, M. K., & Changiz, T. (2011). *Comparison of Heparin Subcutaneous Injection in Thigh, Arm and Abdomen*. Retrieved from website: http://download.springer.com/static/pdf/168

TOOL TO ASSESS PAIN PERCEPTION AND ECCHYMOSIS

AMONG PATIENTS RECEIVING LOW MOLECULAR WEIGHT HEPARIN

Section – A

Demographic Variables:

Sample Number:

1. Age

   a) Below 30 years b) 30-40 years

   c) 41-50 years d) Above 51 years

2. Gender

   a) Male b) Female

3. Educational status

   a) Illiterate b) Primary school

   c) High school d) Higher secondary

   e) Graduate

4. Marital status

   a) Single b) Married

   c) Widow d) Divorce

5. Religion

   a) Hindu b) Christian

   c) Muslim d) Others

6. Occupation

   a) Employed b) Unemployed

Section-B

Clinical Variables:

1. Diagnosis

   a) Stroke b) DVT

   c) CVT d) Others

2. Name of the injection and dose

   a) Inj. Lupenox 0.4ml b) Inj. Flothin 0.4ml

   c) Inj. Enox 0.4ml d) Inj. Clexane 0.4 ml

3. Frequency of Inj. LMWH

   a) Twice a day b) Once in a day

4. Any other illness

   a) Yes b) No

If yes specify, ……...

Section – C

Numerical Pain Rating Scale:

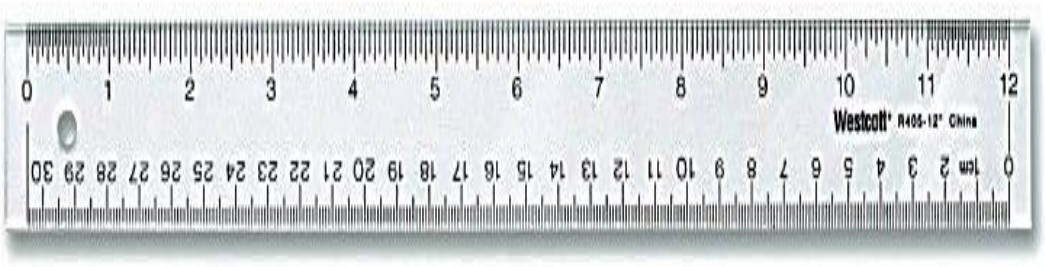
Source: Wong-Baker FACES Pain Rating Scale. From Wong D. L., Hockenberry-Eaton, M., Willson D., Winkelstein M. L., Schwartz, P. *Wong's Essentials of Pediatric Nursing*, 6th ed. St. Louis, MO, 2001, p. 1301. Copyrighted by Mosby, Inc. Reprinted by permission.

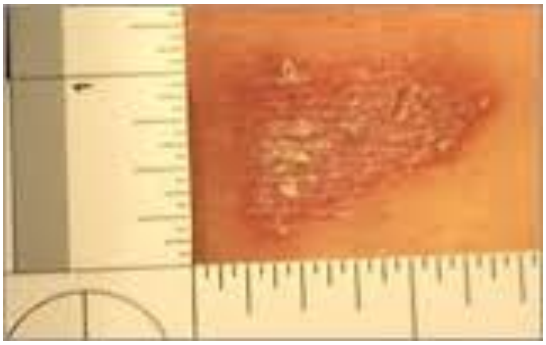
The score is interpreted as:

- 0: No pain
- 1-3: Mild pain
- 4-6: Moderate pain
- 7-8: Severe pain
- 9-10: Unbearable pain

Section – D

Transparent Ruler Scale





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LIST OF ABBREVIATIONS

TITLE		ABBREVIATIONS
LMWH	:	Low Molecular Weight Heparin
CVA	:	Cerebro Vascular Accident
DVT	:	Deep Vein Thrombosis
CVT	:	Cerebro Vascular Thrombosis
DM	:	Diabetes Mellitus
SHT	:	Systemic Hypertension
IHD	:	Ischemic Heart Disease
CHF	:	Congestive Heart Failure
CRF	:	Chronic Renal Failure
PVD	:	Peripheral Vascular Disease

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Abstract

The main aim of the study was to assess the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin in Sri Ramakrishna hospital, Coimbatore. The research design used for the present study was a true experimental posttest only control group design. Total enumerative sampling technique was used to select 25 samples. The samples were randomly assigned to experimental group (n=13) and the control group (n=12). Dry cold application was given for 3 minutes on the LMWH injection site for the experimental group. Injection LMWH was administered subcutaneously to the experimental group and control group. Pain perception was assessed using numerical pain rating scale and ecchymosis was assessed by using transparent ruler scale. Descriptive and inferential statistical techniques were used to analyze the collected data. Using unpaired 't' test, the effect of dry cold application on pain perception was analyzed immediately after withdrawing the needle, after 4 hours and 8 hours ($t = 2.205$, 2.827 and 2.912 respectively, $df = 23$, $p < 0.05$) and ecchymosis was analyzed after 48 hours and 72 hours ($t = 2.129$ and 2.118 respectively, $df = 23$, $p < 0.05$). Hence it is concluded that application of dry cold is effective in reducing the level of pain perception and ecchymosis among patients receiving low molecular weight heparin.

INTRODUCTION

Health is the level of functional or metabolic efficiency of a living organism. In humans it is the ability of individuals or communities to adapt and self-manage when facing physical, mental or social challenges (Webster, 1913). Health is a state in which relative equilibrium of body and function which results from its successful dynamic adjustment to forces tending to disturb it. It is not a passive interplay between body substance and forces impinging upon it but an active response of body forces working towards readjustment. (Park, 2015)

Wellness is an active process of becoming aware of and making choices toward a more successful existence (National Wellness Institute, 2013). Wellness is an active, lifelong process of becoming aware of choices and making decisions toward a more balanced and fulfilling life. Wellness involves choices about our lives and our priorities that determine our lifestyles. (Arizona State University, 2013)

In Biological Medicine, illness is defined as a loss of regulatory capacity: that is, the inability to correctly respond to a wide variety of internal, environmental and lifestyle factors. (Rau, 2013)

Neurological problems pose a serious threat to the population and health care resources. Globally they are the number one cause of death. Stroke is the third leading cause of death in the United States. (Gourie-Devi, 2008)

Worldwide, 20 million people suffer from stroke each year, five million die and another five million are disabled. It is estimated that one in six people will

suffer a stroke in their lifetime. In India, 1.5 million suffer from stroke every year and 3,000 to 4,000 are affected each day. Stroke causes more deaths in the country than malaria, tuberculosis, and HIV combined. (Masand, 2013)

Stroke is the primary cerebro vascular disorder in the United States. Approximately 7,80,000 people experience a stroke each year in the United States. Approximately 6,00,000 of these are new stroke and 1,80,000 are recurrent stroke. Three adults suffer from a stroke every minute in India (Mumbai) and around 5 million people are disabled globally due to the brain attack each year. Yet, half the residents of metros in India are unaware of stroke and their link to the brain. Stroke is divided into two types; they are ischemic stroke and hemorrhagic stroke. (Masand, 2013)

Early treatment with thrombolytic therapy for ischemic stroke results in fewer stroke symptoms and less loss of function. Currently approved thrombolytic therapy has a treatment window of only 3 hours after the onset of stroke. (Suddarth & Brunner, 2014)

Thrombolytic agents are used to treat ischemic stroke by dissolving the blood clot. Anticoagulation for primary stroke prevention after myocardial infarction (MI) is recommended in patients with the following risk factors: persistent or paroxysmal atrial fibrillation, left ventricular thrombus, left ventricular aneurysm, left ventricular ejection fraction (LVEF<25%). (Cruz-Flores, 2015)

The possibility of developing a deep vein thrombosis (DVT) is one major complication for the patient population with damaged blood vessels, decreased circulation problems, or restricted mobility. Use of a low molecular weight

heparin (LMWH), as part of the patients anticoagulation therapy, is one intervention that can be implemented to prevent the formation of thrombi (clots) that cause DVTs, pulmonary emboli, strokes and myocardial infarctions (Suddarth & Brunner, 2014). These complications would not only cause harm to the patient but also increase the resources needed to treat and rehabilitate that individual. (Chenicek, 2004)

LMWHs are defined as heparin salts having an average molecular weight of less than 8000 Daltons and for which at least 60% of all chains have a molecular weight less than 8000 Daltons. Heparin derived from natural sources, mainly porcine intestine or bovine lung, can be administered therapeutically to prevent thrombosis. These are obtained by various methods of fractionalization or depolymerisation of polymeric heparin. However, the effects of natural or unfractionated heparin are more unpredictable than LMWH. (John, 2013)

Subcutaneous low molecular weight heparin (LMWH) is frequently prescribed for stroke, infarct, deep vein thrombosis and other cardiovascular disorders. Low molecular weight heparin (LMWH) is a class of medication used as an anticoagulant. They are administered subcutaneously in fixed doses; once or twice daily. (Melba & Priyalatha, 2009)

The low molecular weight heparin poses many side effects such as pain, fever, confusion, nausea, hemorrhage, hypochromic anemia, thrombocytopenia, bleeding, ecchymosis, injection site hematoma, edema and peripheral edema (Skidmore-Roth, 2009). One of the most commonly encountered adverse physiological responses to this intervention is the formation of hematomas at the injection site. (Batra, 2014)

Health systems need to be strengthened to deliver better care for people with neurological disorders. Primary care is the only access to medical treatment and use low-technology interventions. (United National Report, 2007)

Ice is a therapeutic agent used in medicine as an integral part of injury treatment and rehabilitation. The use of ice pack is widespread because of their effectiveness, convenience, low cost, and ease of transportation. Ice packs can be made with any form of ice; however, 2 commonly used forms are cubed ice and crushed ice. Ice is believed to control pain by inducing local anaesthesia around the treatment area. Investigators have also shown that it decreases oedema, nerve conduction velocities, cellular metabolism, and local blood flow. (Sheikh, 2010)

A simple and inexpensive therapy, dry cold application has been accepted for decades as an effective non pharmacologic intervention for pain management. Application of ice is effective in orthopaedic procedures. (Yagiz, 2006)

A dry cold application can be made by filling an ice bag with crushed ice and wrapping it in a towel or washed cloth which will be colder than moist applications. Dry cold also prevents moisture from coming in direct contact with the skin. (Pamela, 2005)

The physiological effects of cold application are peripheral vasoconstriction, decreased capillary permeability, oxygen consumption, local metabolism, muscle tone, blood flow, lymph flow, motility of leucocytes and increased blood viscosity. (Nancy, 2012)

1.1 Need for the study

The spectrum of neurological disorders includes epilepsy, stroke, headache, Alzheimer's disease and other dementias, Parkinson's disease, multiple sclerosis, brain injuries, neuro infections etc. Stroke is the second most common cause of mortality and a major cause of disability. Up to 1 billion people, nearly one in six of the world's population, suffers from neurological disorders and 6.8 million dying each year. (United National Report, 2007)

Stroke is a major public health concern. An estimated 7, 00,000 persons in the United States and 50,000 in Canada suffer a stroke annually. Stroke is also a leading cause of serious long term disability. With an aging population, a further increase in stroke incidence can be expected. (Devi, 2009)

The devastating stroke consequences have enormous personal, social and economic impact on oneself and the society. Stroke is the second leading cause of death worldwide. (Neurol., et al, 2012)

After an initial stroke, 22% of men and 25% of women will die within 1 year. The percentage is higher for people aged 65 and older. Of those who survive, 50% to 70% will be functionally independent, and 15% to 30% will live with permanent disability. Twenty percent will require long-term care after 3 months. Common long term disabilities include hemiparesis, inability to walk, complete or partial dependence in activities of daily living (ADLs), aphasia, and depression. (Caplan, 2015)

All age groups are affected, mainly elderly above 60 years of age. In India according to the 2001 census there are 77 million people above the age of 60 years and it is expected that by 2025 there will be a huge increase to 177 million with consequent significant rise in age-related disorders such as cerebro vascular disorders, Parkinson's disease and dementia. (Gourie-Devi, 2008)

Stroke is among the top 5 leading causes of death in India and WHO predicts that by 2015, India will report 1.6 million cases of stroke annually, at least one-third of whom will be disabled and by 2050, 80% of stroke cases in the world would occur in low and middle income countries mainly India and China. (Masand, 2013)

Therapeutic strategies such as stroke unit care and treatments including tissue plasminogen activator (tPA) have been developed to treat acute stroke more effectively and lessen the amount of disability that the disease carries. Anticoagulation and antithrombotic therapies remain the main agents for stroke prevention. (Demarin., et al, 2013).

Anticoagulation has proved to be an important treatment modality in preventing thrombus formation. Anticoagulants are often, but incorrectly, referred to as blood thinners. They work by decreasing the formation of additional blood clots. Heparin and low molecular weight heparin are anticoagulants. (Caplan, 2015)

Subcutaneous administration of anticoagulant heparin sodium is a frequently performed nursing intervention. The role of nurses attempting to minimize hematoma formation and patient discomfort during the administration of LMWH. (Batra, 2014)

Low molecular weight heparin poses many side effects. Local side effects include pain, erythema and ecchymosis. Hemorrhagic side effects have occurred in 3% to 7% of patients. Rarely painful red indurations and necrotic ulcerations at the injection site have been reported. Ecchymosis is one of the common side effects associated with LMWH. Ecchymosis is the injury to biological tissue and capillary damage occurs, allowing blood to seep into surrounding tissue. The incidence of bleeding complications was higher in older patients (> 65 years) than younger patients. (Melba & Priyalatha, 2009)

Another side effect which is commonly associated with LMWH is pain at the injection site. Pain is one of the major reasons that persons seek health care. Statistics reveals that about $1 billion is spent each year for relief of pain. (Masand, 2013)

Pain and bruising associated with these injections are problematic for both patients and nurses. The pain has a negative effect on one's self concept. They may lead to anxiety, discomfort, disruption of body image, and the rejection of treatment in patients. So it is becoming an important issue of concern in the nursing field. (Fathi., et al, 2014)

Cold application is the application of a cold agent cooler than skin either in a moist or dry form, on the surface of the skin, to reduce pain and body temperature, to anaesthetize an area, to control the haemorrhage, to prevent gangrene, to prevent oedema and reduce inflammation. (Nancy, 2012)

Dry cold can be applied by means of an ice bag, moist cold by means of towel soaked in ice water, cold hydro collator packs, or immersion in a bath or under running water. (Lewis., et al, 2015)

Uses of dry cold application in reducing the pain perception and progression of ecchymosis have proved to be important. Dry cold application is a simple and inexpensive therapy which has been accepted for decades as an effective non pharmacologic intervention for pain management and progression of ecchymosis. (Melba & Priyalatha, 2009)

The researcher during her clinical experiences came across incidence of pain and ecchymosis at LMWH site and patients complaining of these side effects. Researcher also felt the need for better management of side effects which could be easily accessible and economical for the patients. Dry cold application appears to be a cheaper and easily available therapy to reduce pain and ecchymosis. Hence the researcher has selected study to evaluate effect of dry cold application on pain perception and ecchymosis among patients receiving injection LMWH.

1.2 Statement of the Problem

Effect of Dry Cold Application on Pain Perception and Ecchymosis among Patients Receiving Low Molecular Weight Heparin at Selected Hospital, Coimbatore.

1.3 Objectives

1.3.1 To assess the pain perception and ecchymosis among patients receiving low molecular weight heparin.

1.3.2 To evaluate the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin.

1.4 Operational definition

1.4.1 Effect

It is the reduction of pain perception and ecchymosis after dry cold application which is assessed by numerical pain rating scale and transparent ruler scale.

1.4.2 Dry cold application

It refers to the application, of ice cubes filled in an ice cap over the low molecular weight heparin (LMWH) injection site, 3 minutes prior to its administration, for 5 consecutive days.

1.4.3 Pain perception

It refers to the unpleasant sensation during the administration of LMWH injection which is assessed immediately after withdrawal of the needle, 4 hours and 8 hours of injection by using numerical pain rating scale.

1.4.4 Ecchymosis

It refers to the discolouration of the skin caused due to the escape of blood into the tissues from ruptured blood vessels following subcutaneous injection (LMWH). This is assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale.

1.5 Hypothesis

H_1 : There will be a significant difference in the level of pain perception between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin.

H_2 : There will be a significant difference in the size of ecchymosis between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin.

1.6 Conceptual framework

Conceptual framework of this study was based on the helping art in clinical nursing theory by Ernestine Widen Bach in 1964. The theory focuses on three concepts such as identification, ministration and validation. According to Widen Bach, nursing practice, consist of identifying a client's need for help, ministering the needed help and validating the needed help.

(i) Identification

Identification involves viewing a client as an individual with unique experiences and understanding the client's perception of the condition. In this study, identification refers to the selection of patients who are receiving Inj. LMWH based on the demographic variables including age, gender, educational status, marital status, religion, occupation and clinical variables including diagnosis, name of the injection and dose, frequency of injection LMWH and presence of any other illness.

(ii) Ministration

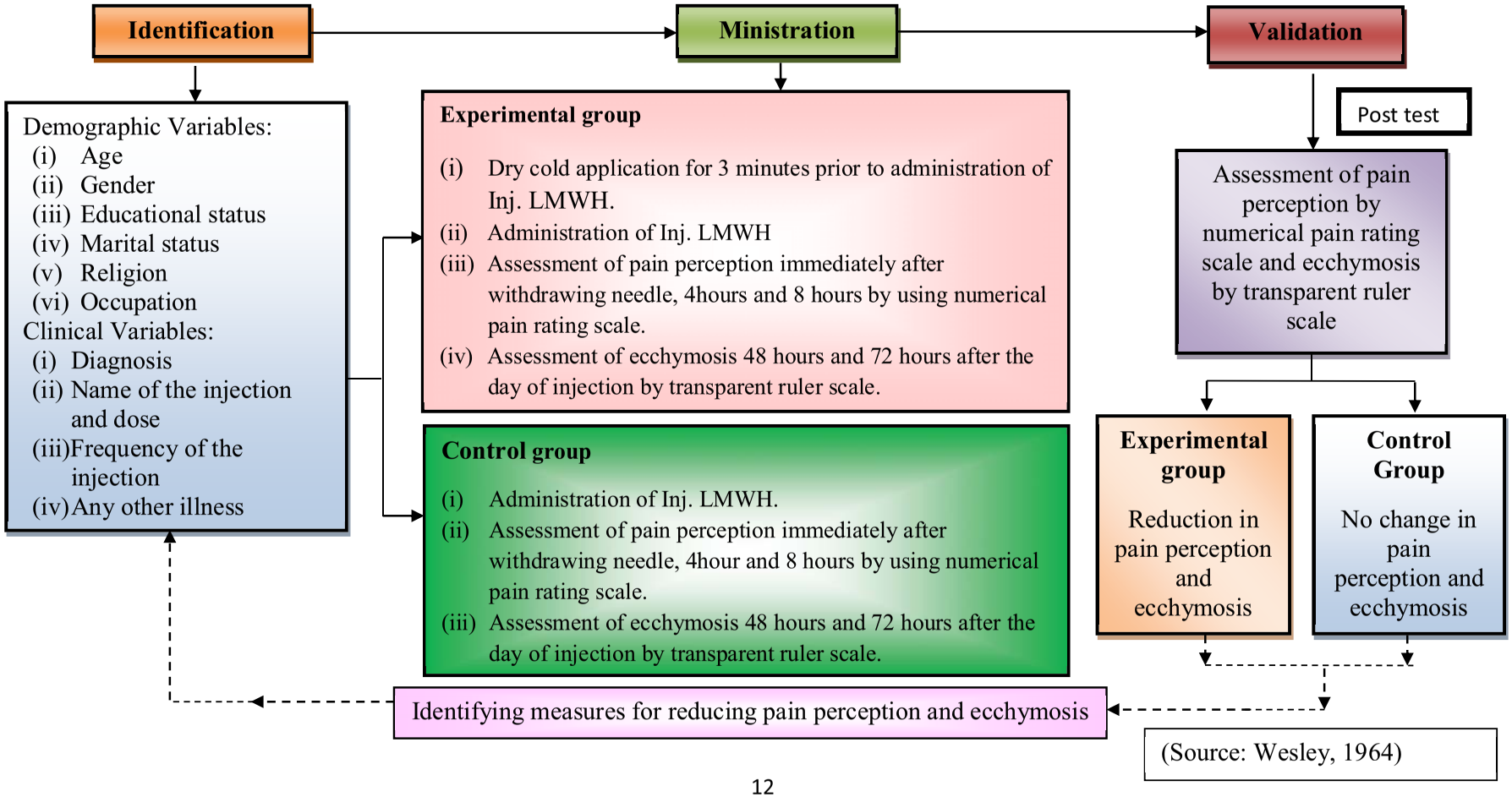
Ministration refers to the provision of needed help. In this study, the researcher randomly assigned to the samples into experimental group (n=13) and the control group (n=12). Dry cold application was given for 3 minutes on the LMWH injection site for the experimental group. Injection LMWH was administered subcutaneously to the experimental group and control group. The pain perception was assessed immediately after withdrawing needle, 4 hours and 8 hours by using numerical pain rating scale and ecchymosis was assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale for both experimental group and control group.

(iii) **Validation**

Validation refers to the collection of evidence that shows that the clients needs have been met and the functional ability has been restored as a result of ministration. Here the validation refers to the assessed evaluation of the effect of dry cold application on pain perception and ecchymosis in the experimental group and the control group by using numerical pain rating scale and transparent ruler scale.

Figure 1.1

Conceptual framework on modified Widen Bach's helping art of clinical nursing theory (1964)



(Source: Wesley, 1964)

1.7 Projected outcome

Dry cold application on the injection site will reduce pain perception and ecchymosis among patients receiving injection low molecular weight heparin.

REVIEW OF LITERATURE

Review of literature is an evaluative report of information found in the literature related to selected area of the study. The review describes, summarizes, evaluates and clarifies a theoretical base for the research and helps to determine the nature of research.

For the present study, related literature was reviewed and organized in the following manner.

2.1 Literature related to low molecular weight heparin.

2.2 Literature related to effect of cold application

2.3 Literature related to effect of dry cold application on pain perception and ecchymosis.

2.1 Literature Related to Low Molecular Weight Heparin

Dadaeen., et al (2015) conducted a study on the effect of duration of subcutaneous injection on the extent of bruising and pain intensity at injection sites among patients receiving enoxaparin sodium. Convenience sampling was used. For each patient, two subcutaneous injection methods were performed: 10-second subcutaneous injection on the right side of the abdomen as the control group and 30-second subcutaneous injection on the left side of the abdomen as the intervention group. At the first, injection site was determined using simple random assignment. The bruising area was analyzed by using computer software 48 and 72 hours after each injection. Also, pain intensity was measured by Numeric Rating Scale (NRS) immediately after each injection. Data were analyzed using non-parametric tests. Statistical significance was set at $P<0.05$. The mean and

standard error of bruising in 10 and 30-second injections after 48 hours were 45.53 ± 6.35 and 23.69 ± 3.27 mm2, respectively. After 72 hours, these measures were obtained as 26.45 ± 4.70 and 14.76 ± 3.52 mm2, respectively ($P<0.001$). Besides, the median and interquartile range of pain intensity scores in 10 and 30-second injections were 5 (4 - 7) and 3 (1.25 - 5), respectively, ($P<0.001$). The results indicated that increasing the length of enoxaparin subcutaneous injection reduced the extent of bruising and pain intensity at the injection sites.

Fathi., et al (2014) conducted a study to compare the effects of air locks and duration of pain and bruising caused by the subcutaneous heparin injection. Quasi-experimental study was done on 35 patients treated with subcutaneous heparin. For each patient, two injections of 10 seconds without the use of an air lock (the usual method), and 30 seconds with the use of air lock (case study method) were carried out in the abdomen on the right and left, randomly. The interval between injections was 12 hours. Bruising 24 and 48 hours after injection was measured using a plastic ruler and pain was measured using the VAS scale immediately and 24 hours after injection. Size of the bruises caused by the injections in study method was significantly less than the size of the bruises caused by injection in the usual method ($P\geq0.0$). Average size of the bruises in the usual method at 24 and 48 hours after injection of subcutaneous heparin were 1.791 and 1.817 respectively, and 0.854 in study method. Increasing the injection duration to 30 seconds and use of an air lock heparin subcutaneous injection is recommended.

Sari., et al (2014) conducted a study on slow versus fast subcutaneous heparin injections for prevention of bruising and site-pain intensity. Samples who met the inclusion criteria, involving 50 participants with a mean age of 55.25 (± 12.37) years were selected. Each participant had two injections, one in the left side and one in right side of the abdomen. One of these was injected slowly (intervention) and the other was injected fast (control). The second injection was 12 hours after the first injection. The duration of fast injection was 10 seconds and the duration of slow injection was 30 seconds. The mean pain intensity was 13.9 ± 17.1 mm with the slow injection and 20.6 ± 22.3 mm with the fast injection ($P<0.001$). In addition the bruising sizes were smaller with slow injections compared to fast injections at 48 hours follow-up (mean bruising size 18.76 ± 9.32 mm^2 with the slow injection and 109.2 ± 468.66 mm^2 with the fast injection, $P=0.033$) and 72 hours follow-up (mean bruising size 21.72 ± 76.16 mm^2 with the slow injection and 110.12 ± 472.86 mm^2 with the fast injection, $P=0.025$). The study reported significantly lower pain intensity for slow versus fast injection.

Avsar & Kasikci (2013) conducted a study to determine and compare the effects of four different injection techniques on pain and bruising associated with subcutaneous heparin. The study used a quasi-experimental design. The four different injection techniques are application of subcutaneous heparin without aspiration, using airlock technique without aspiration, with aspiration and without airlock technique, without aspiration and with airlock technique and two minute cold application. The research involved ninety-five patients. Each subject received

four injections by the same investigator using four different techniques. Site bruising was measured at forty-eight and seventy-two hours after each injection. The bruising size was measured using milimetric transparent polyethylene wrap and the verbal pain scale. There was significant difference in the size of bruises and pain perception in each technique among the subjects. Results of the study show that use of air lock technique without aspiration and two-minute cold application to the area of injection reduces bruising and pain.

John (2013) conducted a study on the effect of time duration in injecting subcutaneous heparin on pain and bruising among patients receiving low molecular weight heparin injections. It was a quantitative true experimental-cross over design among 179 patients receiving subcutaneous low molecular weight heparin. In first group the staff nurses administered the first injection using standard time duration; the time was noted by the investigator. The second injection was given slowly over 30 seconds by the investigator. The pain was measured by using VAS and bruise by using transparency scale. In second group, first injection given by the investigator and the second injection given by the staff nurses. The result shows that of administering injection over 30 seconds reduces pain and bruising.

Palesa & Aidone (2012) conducted a study on the occurrence and extent of bruise according to duration of administration of subcutaneous low molecular weight heparin. The results showed that 87 bruises were observed out of 300 injections.

Neurol., et al (2012) conducted a study on the low-molecular-weight heparin and early neurologic deterioration in acute stroke caused by large artery occlusive disease (LAOD). Post analysis of controlled trial design was used. Among 603 patients recruited, 353 patients (180 treated with LMWH, 173 with aspirin) had acute ischemic stroke and LAOD. Patients were randomly assigned to receive either subcutaneous LMWH or oral aspirin within 48 hours after stroke onset for 10 days, and then all received aspirin once daily for 6 months. For patients with acute ischemic stroke and LAOD, treatment with LMWH within 48 hours of stroke may reduce early neurologic deterioration (END) during the first 10 days, mainly by preventing stroke progression. Early neurologic deterioration within the first 10 days occurred in 6.7% of LMWH allocated patients (12 of 180 patients) compared with 13.9% of aspirin-allocated patients (24 of 173). Low molecular-weight heparin was significantly associated with the reduction of early neurologic deterioration (absolute risk reduction, 7.2%; 0.44; 95% CI, 0.21-0.92). When individual components of early neurologic deterioration were examined, LMWH was significantly associated with a lower frequency of stroke progression within the first 10 days compared with aspirin (5.0% [9 of 180] vs 12.7% [22 of 173]; or, 0.36; 95%CI, 0.16-0.81). Early neurologic deterioration was significantly associated with 6-month disability with both LMWH (12.75; 95% CI, 3.27-49.79 on Barthel Index and, 18.15; 95% CI, 2.09-157.93 on modified Rankin Scale) and aspirin (6.09; 95% CI, 2.44-15.20 on Barthel Index and, 7.50; 95% CI, 2.08- 27.04 on modified Rankin Scale) groups.

Zeraatkari., et al (2011) conducted a study to compare the effect of subcutaneous heparin injection on thigh, arm and abdomen. This semi experimental complete crossover study was performed on 58 patients who received subcutaneous heparin injection, in randomly ordered sites (abdomen, arm, and thigh) with a 12 hours interval. The pain intensity was estimated immediately after injection using visual analog scale (VAS). Bruise size was observed and measured 24, 48 and 72 hours after injection. Statistical analysis was performed using ANOVA. Pain intensity was significantly decreased from arm to thigh and then to abdomen. According to the results of this study, abdomen area may be considered as the preferred site for subcutaneous heparin injection because of less pain intensity.

Jamula., et al (2009) conducted a study on comparison of pain and ecchymosis with low-molecular-weight heparin (LMWH) vs. unfractionated heparin (UFH) in patients requiring bridging anticoagulation after warfarin. This research randomized 24 patients to receive subcutaneous LMWH or UFH twice-daily during the perioperative period. Injection associated pain was recorded using a visual analogue scale and area of ecchymosis was measured by digital photography of the injection site on the day of the procedure. The results shows that the area of ecchymosis was 2-fold higher with UFH than LMWH (19.4 cm^2 vs. 8.98 cm^2; P=0.33) and pain was similar with both treatments (115 mm vs. 171 mm; P=0.25).

Akpinar & Calebioglu (2008) conducted a study to compare the effects of three different injection durations on bruising associated with subcutaneous heparin. The study used a quasi-experimental design. The research involved 36 chronic obstructive pulmonary disease (COPD) patients. Each subject received three injections by the same investigator using three different techniques. Site bruising was measured at 48 hours after each injection. The bruising size was measured using a plastic ruler. Descriptive statistics, Wilcoxon signed-rank and McNemar chi-square tests were used to evaluate the data. The level of significance was determined at $P<0.05$. The 30 seconds injection duration and waiting 10 seconds before withdrawing the needle resulted in significantly smaller and less bruises than 10 seconds injection duration. The 30 seconds duration or waiting 10 seconds before withdrawing the needle should be used for subcutaneous heparin injections in clinical practice.

Zaybak & Khorshid (2008) conducted a study on the effect of the duration of subcutaneous heparin injection on bruising and pain. This study was quasi-experimental research. The sample for the study consisted of 50 patients. Heparin was injected over 10 seconds on the right abdominal site and over 30 seconds on the left abdominal site. Injections areas were assessed for the presence of bruising at 48 and 72 hours after each injection. Bruising was measured using transparent millimetric measuring paper. The visual analog scale (VAS) was used to measure pain intensity and a stop-watch was used to time the pain period. Data were analyzed using chi-square test, Mann-Whitney U, Wilcoxon signed ranks tests and correlation. The percentage of bruising occurrence was 64% with the injection of 10 seconds duration and 42% in the 30-second injection. It was determined that

the size of the bruising was smaller in the 30-second injection. Pain intensity and pain period were statistically significantly lower for the 30-second injection than for the 10-second injection. It was determined that injection duration had an effect on bruising and pain following the subcutaneous administration of heparin.

Nair., et al (2008) conducted a study on effect of time taken in injecting subcutaneous heparin injection with reference to site pain and bruising. In the present study a two group design was used among cardiac patients undergoing heparin therapy. In the control group, the time taken for administering subcutaneous heparin in the routine practice was noted, while in the experimental group 30 seconds injection technique was utilized. All other steps of injection administration were kept same in both the groups. A total of 100 injection sites were taken in each group and assessed for pain at 0, 24, 48, 60 hours and for bruise at 24, 48 and 60 hours. It was observed that, in the control group, nurses gave the injections over 4-10 seconds. Results show that there was no significant difference in the perceived site pain in both groups. However, when mean bruise sizes were compared, it was observed that they were significantly less in the subjects receiving subcutaneous heparin injection through the 30 second injection duration technique ($p<0.05$).

Neshat., et al (2005) conducted a study to determine the relation between duration of injection of subcutaneous heparin and extent of local skin discoloration. The research design was quasi-experimental design. Consecutive sampling technique was used to select 167 patients. Data collection was done by using a researcher-made check-list consisting of section of demographic

characteristics and a section to record the extent of discoloration at 48 and 60 hours after injection. Data analysis was done by distributional index and parametric (paired-t test) and Bi-parametric (Mann Whitney-U and Kruskal Wallis). Extent of local skin discoloration was less in 30-second injection technique, so that the mean size at 48 and 60 hours after 10-second injection techniques (82.85, 214.3; 77.96, 206 respectively) was more than the mean size at 48 and 60 hours after 30-second injection technique (40.53, 148.11; 44.41, 175.51 respectively). There was a significant relationship between sex and size of discoloration ($p<0.001$), so that mean size in females in the 10-second and 30-second injection techniques at 48 and 60 hours after injection was more than that in males. Administering subcutaneous heparin injection over longer duration, especially in females reduces injection site discoloration.

Chan (2001) conducted a study on the effects of injection duration on site-pain intensity and bruising associated with subcutaneous heparin. This research study determines the effects of injection duration (10 and 30-seconds) on site-pain intensity and bruising. The research used a quasi-experimental research design. The research involved 34 stroke patients receiving low-molecular weight heparin. For each subject, one of the two injection techniques was used as the first injection and 12 hours later the other injection technique was used. Subjects rated the level of perceived site-pain intensity using the vertical visual analogue scale (VAS). Injection-site bruising was measured at 48 and 60 hours after each injection. Digital planimetry was used to measure the surface-area of bruise tracings. The final data set for analysis consisted of 68 VAS pain scores and 136 bruise sizes. Wilcoxon Signed-Rank tests were used to determine the

effects caused by injection duration on site-pain and bruise size. The level of significance was determined at $P<0.05$. Results indicated that the 30-second duration injection technique resulted in significantly less intense site-pain and fewer and smaller bruises. The result shows that administering a subcutaneous heparin injection over longer duration reduces injection site-pain and bruising.

Klingman (2000) conducted a study on effects of changing needles prior to administering heparin subcutaneously would cause less ecchymosis at the injection site. A quantitative study, a measurement of ecchymosis was obtained 48 hours after injection of heparin on the right side of the abdomen, where the needle was changed before injection. A second measurement was obtained 48 hours after injection on the left side of the abdomen, where the needle was not changed before injection. A comparison was then made of the two measurements. The student 't' test for related samples was used, and the significance was set at $P<0.05$. The mean size of the ecchymosis for the sites where the needle was changed was 5.16 mm, and the mean size of the ecchymosis for the sites where the needle was not changed was 5.44 mm ($P=0.87$). Changing the needle before the administration of subcutaneous heparin did not decrease the size of ecchymosis as compared with the size of ecchymosis when the investigator did not change the needle.

Kalafut., et al (2000) conducted a study on anticoagulation with intravenous unfractionated heparin (IVUH) while awaiting therapeutic oral anticoagulant levels is a common practice in patients with acute and sub-acute cerebral ischemia. A promising alternative strategy is to use bridging subcutaneous low molecular weight heparin (LMWH), which may have a

favorable risk-benefit profile compared with IVUH and may permit earlier discharge with completion of transition to warfarin therapy as an outpatient. A LMWH, enoxaparin 1 mg/kg BID, was used as bridging anticoagulation therapy in 24 consecutive patients admitted to a university stroke center in which the treatment plan included transition from acute to chronic anticoagulation. Fewer patients in the LMWH bridging therapy group experienced neurological worsening than in the IVUH bridging therapy group (2/24 versus 8/24; P-0.033). Fewer total adverse events were noted in the LMWH group than in the IVUH cohort (3 versus 20; P-0. 002). Fifteen of the 24 LMWH patients (62.5%) were discharged while still receiving LMWH and completed transition to warfarin as outpatients, receiving an average of 3.6 days of outpatient transitional therapy. In this pilot cohort with sub-acute cerebral ischemia, bridging LMWH appeared to be safer than bridging IVUH and was associated with reduced hospital stay and reduced total cost of care.

Wooldridge & Jackson (1998) conducted a study on evaluation of bruises and areas of induration after two techniques of subcutaneous heparin injection. Variables studied included syringe size, change of needles after drawing medication into the syringe, use of an air bubble, and type of sponge (dry or alcohol) applied to the site after injection. The sample included 50 medical-surgical patients aged 23 to 88 years. Each subject received two injections by the same investigator using two different techniques. Sites were inspected and bruises and induration measured 52 hours after each injection. To compare the size of bruises and indurations, the data were analyzed by the Mann-Whitney U-Wilcoxon rank sum test, which showed a 0.003 level of significance for bruises

and a 0.02 level of significance for induration. To compare the number of subjects in whom bruises and indurations developed, the data were analyzed by the chi-square test, which showed a 0.0458 level of significance for induration but only a 0.1371 level of significance for bruising.

Hadley., et al (1996) conducted a study on effect of syringe size on bruising following subcutaneous injection among 29 subjects. They received 5000 units of subcutaneous heparin twice a day. Subjects received their regularly scheduled subcutaneous heparin injections with a 3-ml or a 1-ml syringe in a randomized sequence using a standardized procedure. Injection sites were assessed for bruises and indurations at 24, 48, and 72 hours after injection. The incidence of injection site bruising with 1ml and 3ml syringes was 79% and 69%, respectively. The use of a 3ml vs 1ml syringe resulted in significantly smaller bruises at 48 and 72 hours after injection. Indurations at the injection site occurred in three patients.

Gowan & Wood (1990) conducted a study to evaluate techniques used for administering heparin subcutaneously on bruising at the injection site. This experimental study tested the effects of four different subcutaneous injection techniques on bruising at the injection site. The independent variables of aspiration of the syringe prior to injecting heparin and pressure on the site following injection, and the dependent variable of size of bruising were studied. After the first injection, fewer subjects who received pressure following the injection had bruising. However analysis of subsequent injections shows aspiration of the syringe had little effect on bruising.

2.2 Literature Related to Effect of Cold Application

Sendir., et al (2015) conducted a study to compare the effects of the injection duration (30 seconds) and local dry cold application (5 minutes before and after injection) on pain intensity and bruising at the injection site in subcutaneous heparin injections. This was a randomized controlled, prospective, experimental study. The sample consisted of 60 patients receiving subcutaneous injections of heparin once a day. A computerized randomization program was used to allocate the patients to 3 experimental groups: group A (30-second injection duration), group B (30-second injection duration and 5-minute dry cold application applied locally), and group C (injection administered for 10 seconds and no dry cold application applied locally). This study observed statistically significant differences in pain intensity and bruising occurrence and formation measured over time among groups A, B C. In the present study, the incidence of bruising was high (70%), and the size of the bruises peaked at 48 and 60 hours, respectively, after the 10-second subcutaneous injections. bruising incidence was determined high level at 48 hours after the rapid subcutaneous application. This study concluded that subcutaneous injection duration of 30 seconds and 5-minutes local dry cold application (before and after injection) can be effective in decreasing the intensity of pain and in reducing the occurrence of bruising.

Sheikh (2010) conducted a study on the effectiveness of ice cube application in reducing pain before giving intra muscular injection among adults. In this study pre-experimental design (one group pre-test, posttest) was used. Independent variable was ice cube application and the dependent variable was pain during intramuscular injection. 60 patients were selected using purposive

sampling technique. Pre-test score of pain level was obtained by using numerical pain scale. And post test score of pain was obtained following the application of ice cube for 10 minutes. The result shows the ice cube application was effective in reducing pain before giving intra muscular injection among adults.

Sunny (2010) conducted a study on the effectiveness of local cold application on pain response during intravenous procedures among children. In this study posttest only control group design was used. The sample for the study comprised of 60 children with age group of 3-12 years, 30 children for experimental group and 30 children for control group who are undergoing intravenous procedures. After administering the local cold application pain was assessed by using Eastern Ontario Pain Scale. The result shows the local cold application was effective on pain response during intravenous procedures.

George (2008) conducted a study on the effectiveness of ice cube as an anesthetic pretreatment for intradermal injection among adults. The research design was the quasi experimental posttest only control group design. The sampling procedure was non probability purposive sampling technique with random assignment to experimental and control group. The sample size was 40 adults receiving intradermal injection. Twenty subjects were in the control group and 20 subjects were in the experimental group. Ice cube was applied at the site of injection for 3 minutes prior to intradermal injection for experimental group and ice cube was not applied for control group. The intensity of pain during the procedure in both the groups was assessed using visual analogue scale. The result shows that there is a significant reduction in pain during intra dermal injection among adults.

Pushpa., et al (2008) conducted a study on prevention and reduction of pain, bruise and hematoma by moist ice pack application on the subcutaneous heparin injection among 200 subjects. Subjects in the experimental group received moist ice pack application for 5 minutes twice daily for 3 days .The pain was assessed by using visual analogue scale at 12 hours, 48 hours and 72 hours after the first subcutaneous heparin injection. Result showed that 66% of subjects in the experimental group had no pain at 72 hours, however only 7% in control group had no pain at 72 hours. They concluded that the application of moist ice pack can be effective in preventing and reducing pain, bruise and haematoma at subcutaneous heparin injection site.

Hasanpour., et al (2006) conducted a study on the effects of two non-pharmacologic pain management methods for intramuscular injection pain. 90 children with ages from 5 to 12 years who had penicillin injection intramuscularly were studied. The samples were divided into three groups: the first group received local cold therapy, the second group received distraction and the third group (the control group) received routine care. Oucher scale was used to measure pain intensity. The average pain score in local cold therapy was 26.3, in distraction were 34.3 and in control group were 83.3 respectively, which show that local cold was effective in reducing intramuscular injection related pain. The results measured as pain intensity was significantly higher in the control group than the experimental groups.

Ebner (1996) conducted a study to determine whether cold therapy decreased the perceived pain associated with intramuscular injection. A quasi experimental study was used. 40 patients with age 10 to 80 years was randomly assigned to control and experimental group. The experimental group had an ice pack was applied on the injection site 15 minutes prior to injection and control group with normal routine care. Patients who receive cold therapy showed significant reduction in intra muscular injection pain.

Ross & Soltes (1995) conducted a study to determine the effect of ice application to the site of subcutaneous heparin injection on pain, incidence and size of haematoma formation. The study used a quasi-experimental design with the subjects as their own control. A convenience sample of 70 subjects was each given two injections of subcutaneous heparin, 12 hours apart. Ice was applied pre- and post-injection to one of the sites. Immediately following each injection, the subjects were asked to rate the level of perceived discomfort at the time of the injection using a visual analogue scale. Forty-eight hours post-injection, the researcher inspected the injection sites for the presence of haematoma. Results showed that when ice was applied the subject's perception of pain was significantly less.

2.3 Literature Related to Effect of Dry Cold Application on Pain Perception and Ecchymosis

Batra (2014) conducted a study on the application of ice cube prior to subcutaneous injection of heparin on pain perception and ecchymosis of patients with cardiovascular problems. It was a quasi-experimental study posttest only control group design among 30 experimental group and 30 control group patients. The independent variable for the study was ice cube application for 3 min and the dependent variables were pain perception and ecchymosis. Subjects were asked to rate pain immediately after the needle was withdrawn and ecchymosis was observed 48 hours after the day of injection. Calculated 't' value was 5 for pain perception and 4.4 for ecchymosis was statistically significant at 0.05 level. Ice cube application prior to injection is effective for pain perception and ecchymosis.

Melba & Priyalatha (2009) conducted a study on the effectiveness of dry cold application on the occurrence of bruising and pain at the subcutaneous injection site of LMWH. It was an experimental study among 30 patients in the interventional group and 30 patients in the control group with cardiovascular problems. Dry cold was applied for duration of 15 minutes to the interventional group for three consecutive days. The intensity of pain was reassessed after 1 hour, 4 hours and 8 hours of injection and area of bruising was reassessed after 8 hours. This study finding indicates that dry cold application was effective in reducing the intensity of pain and bruising among interventional group after dry cold application (pain score 0-1) when compared to the control group (pain score 1-4). The findings at 1 hour and 24 hours ($t=9.856$ and 2.693 respectively, $p<0.05$), Fishers Exact 4.104, $p< 0.05$ were statistically significant.

Varghese., et al (2006) conducted a study on effect of moist ice pack application on prevention and reduction of pain, bruise and hematoma on the site of subcutaneous heparin injection. The sample size consisted of 100 each in the experimental and control group respectively. The moist ice pack application was performed for 5 minutes at the subcutaneous heparin injection site twice daily for three days in the experimental group. Assessment of pain, bruise and hematoma were carried out at 12, 48 and 72 hours in both the groups. Results were statistically significant in favour of the use of moist ice pack while comparing the pain and bruise at subcutaneous injection site between experimental and control group at 12, 48 and 72 hours ($p<0.05$ and $p< 0.01$).

Kuzu & Ucar (2001) conducted a study on the effect of local dry cold application on the occurrence of bruising, haematoma and pain at the injection site of subcutaneous low molecular weight heparin. The research involved 63 patients who had received 40 mg enoxaparin and who were divided into four treatment groups. In the first group, cold was not applied. Cold was applied to the injection site for 5 minutes before the injection in the second group, and for 5 minutes after the injection in the third group. In the fourth group, cold was applied to the injection site for 5 minutes pre and post injection. Following each injection, the patients pain intensity and induration were measured, and the presence of bruise and haematoma were measured at 48 and 72 hours after the injection. Results showed that the subjects pain perception was significantly less with ice application.

METHODOLOGY

This chapter deals with the description of research approach, research design, research setting, sampling technique, criteria for sample selection, variables of the study, tools for data collection, pilot study, procedure for data collection and techniques of data analysis and interpretation.

3.1 Research Approach

Quantitative research approach involves the generation of data in quantitative form (Polit & Beck, 2012)**.** The present study was aimed to assess the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin. In view of the nature of problem and to accomplish the objectives, quantitative research approach was adopted for the study. The changes in the dependent variables are measured after manipulating the independent variable.

3.2 Research Design

The research design used for the present study was true experimental posttest only control group design. In this study the samples were selected using total enumerative sampling technique and were randomly assigned to experimental and control group (Sharma, 2011). The dry cold application was given to the experimental group for 3 minutes prior to administration of injection LMWH. Injection LMWH was administered to the experimental and control group. Posttest was done to the experimental and control group to examine the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin.

3.3 Setting

The study was conducted in the general (neuro ward) and special wards of Sri Ramakrishna Hospital, Coimbatore. It is a 700 bedded super specialty hospital under the SNR Sons Charitable Trust. In this approximately 318 patients receive Injection LMWH per year and 27 patients per month.

3.4 Population

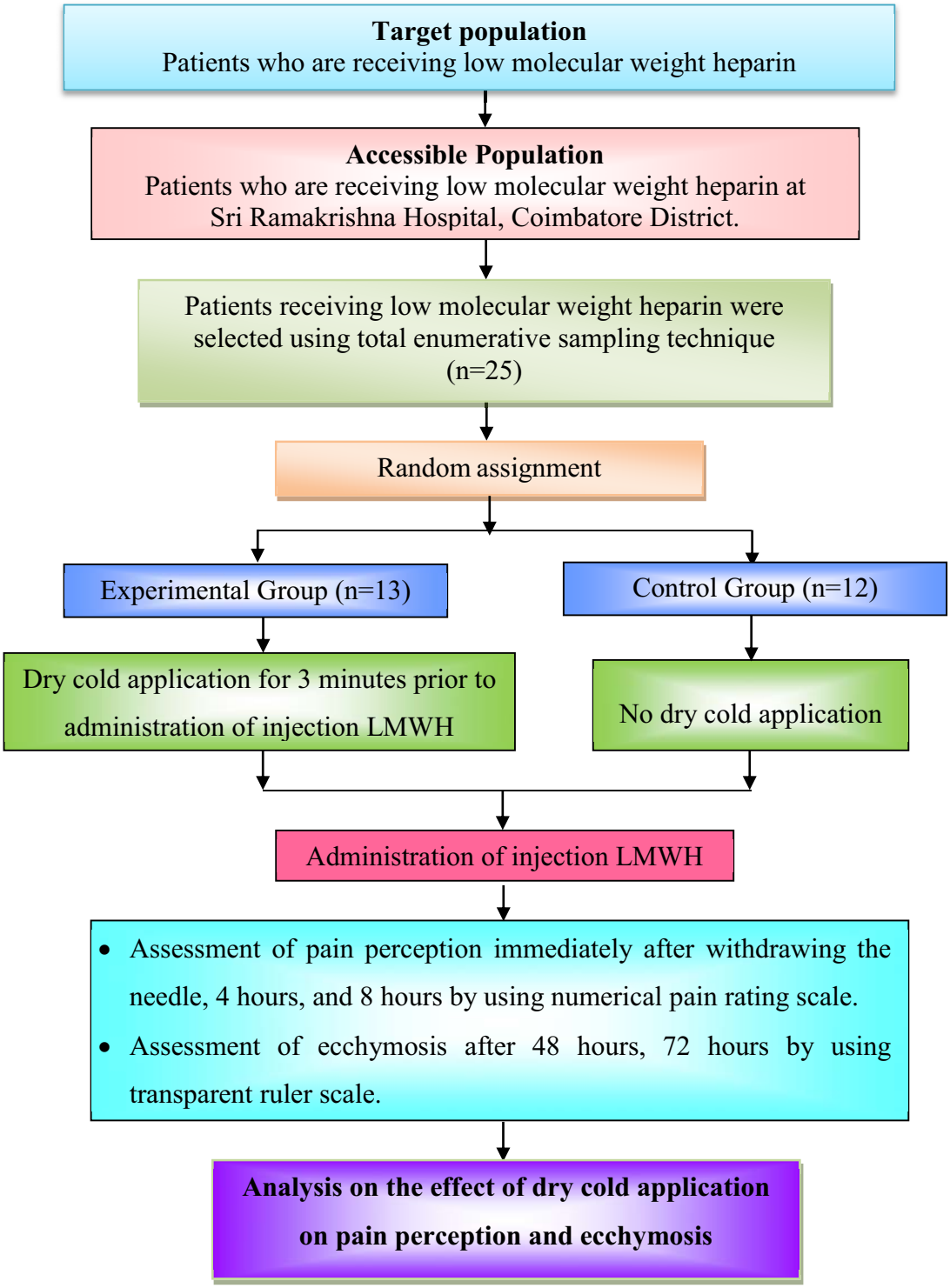
Target population for the present study was the patients who are receiving low molecular weight heparin. The accessible population includes the patients who are receiving low molecular weight heparin in Sri Ramakrishna Hospital, Coimbatore District during the study period.

3.5 Sampling

Total Enumerative Sampling technique was used to select the samples. Totally 25 patients were receiving injection low molecular weight heparin during the period of data collection. All the 25 patients who met the sampling criteria were randomly assigned to experimental group (n=13) and control group (n=12) using lottery method.

Figure 3.1

Schematic Representation of Research Process



3.6 Criteria for Sample Selection

3.6.1 Inclusion Criteria

- Patients who are receiving LMWH (Low Molecular Weight Heparin).
- Patients of all age groups.

3.6.2 Exclusion Criteria

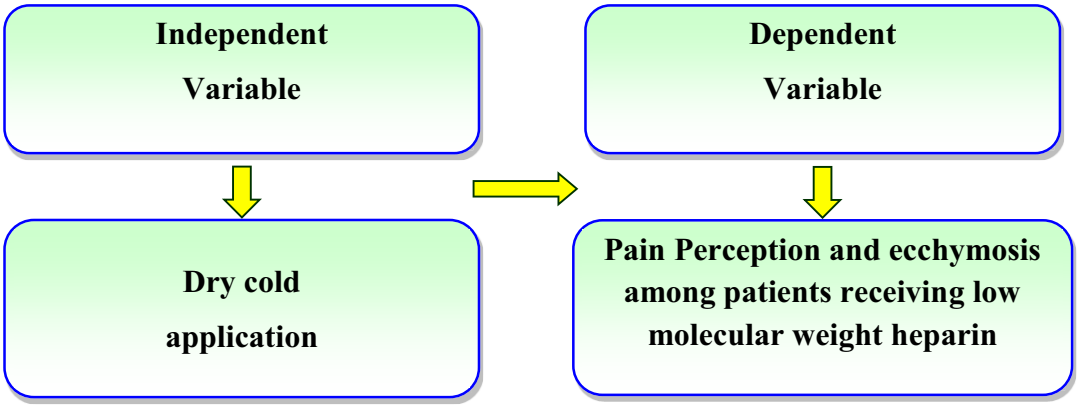
- Patients who are unconscious.
- Patients with haemorrhagic vascular cerebral stroke.
- Patients with impaired renal function.
- Patients with uncontrolled arterial hypertension.

3.7 Variables of the Study

The independent variable in the present study was dry cold application. The dependent variables in the present study were pain perception and ecchymosis among patients receiving low molecular weight heparin.

Figure 3.2

Diagrammatic Representation of Variables



3.8 Tools of Data Collection

The demographic profile, clinical profile, numerical rating scale and transparent ruler scale were framed based on the expert opinion and the supportive literatures. The following tools were used for the data collection to assess the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin and it consists of four sections.

3.8.1 Questionnaire on Demographic profile

3.8.2 Questionnaire on Clinical profile

3.8.3 Numerical pain rating scale

3.8.4 Transparent ruler scale

3.8.1 Questionnaire on Demographic Profile

Demographic profile consists of sample number, age, gender, educational status, marital status, religion, occupation.

3.8.2 Questionnaire on Clinical Profile

Clinical profile consists of diagnosis, name of the injection and dose, frequency of Inj. LMWH, and presence of any other illness.

3.8.3 Numerical Pain Rating Scale to Assess Pain Perception

This standardized Numerical Pain Rating Scale given by Mc Caffery (1989) was used to assess the level of pain perception among patients receiving low molecular weight heparin. The pain perception was assessed in the right and left upper outer arm, right and left thigh. The scale has five categories such as No pain, mild pain, moderate pain, severe pain and unbearable pain. The total score is 10.

The score is interpreted as:

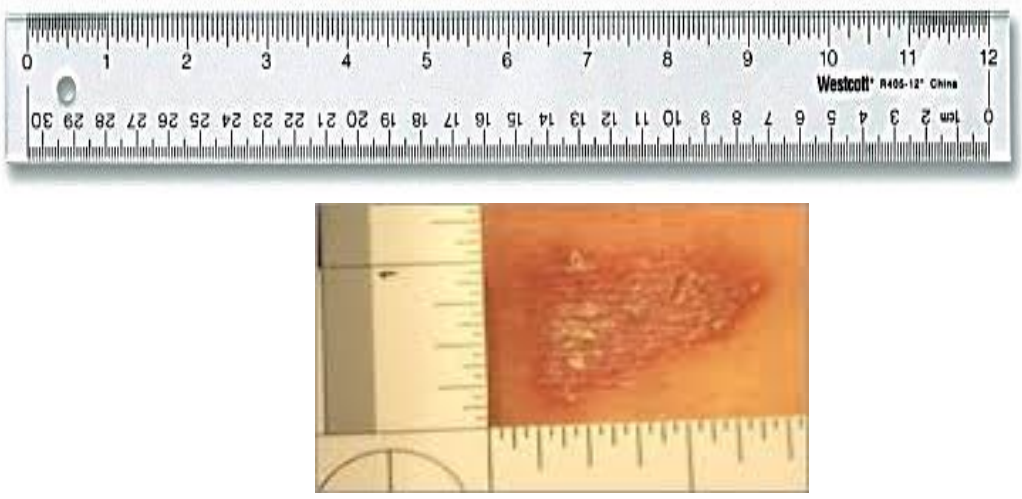
Source: Wong-Baker FACES Pain Rating Scale. From Wong D. L., Hockenberry-Eaton, M., Willson D., Winkelstein M. L., Schwartz, P. *Wong's Essentials of Pediatric Nursing*, 6th ed. St. Louis, MO, 2001, p. 1301. Copyrighted by Mosby, Inc. Reprinted by permission.

- 0: No pain
- 1-3: Mild pain
- 4-6: Moderate pain
- 7-8: Severe pain
- 9-10: Unbearable pain

3.8.4 Transparent Ruler Scale to Assess Ecchymosis

The size of the ecchymosis was assessed in the right and left upper outer arm, right and left thigh by using transparent ruler scale. The length and width of the ecchymosis was measured and the total surface area calculated in $cm^{2.}$

Area = Length × Width (l × w)



3.9 Dry Cold Application Procedure

After the selection of samples the demographic and clinical data was collected. The patient was placed in a comfortable position. All the articles were assembled near the patient. The ice cap was filled with ice cubes. Dry cold application was given for 3 minutes on the LMWH injection site for the experimental group. Injection LMWH was administered subcutaneously to the experimental group and control group. Pain was assessed immediately after withdrawing the needle, 4 hours and 8 hours by using numerical pain rating scale. Ecchymosis was assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale.

3.10 Validity and Reliability of the Tool

Validity refers whether an instrument accurately measures what it is supposed to measure. The prepared tool was validated by seven subject experts that included six nursing faculty and one medical expert. The experts were requested to give their opinion and suggestions regarding relevance, appropriateness, accuracy and degree of agreement in each item of the tool. Suggestions and recommendations given by the experts were accepted and necessary corrections were done. The content validity of each item of the tool was computed using Lynn's item wise content validity index (I- CVI) and the values were found to be greater than 0.83 and which indicates the content validity based on I-CVI interpretation for six or more experts. So the tool was found to have high content validity. Test-retest reliability value of numerical pain rating scale is r = 0.76 to r = 0.89.

3.11 Ethical Committee Clearance

The proposed study and tool were presented to the institution ethical committee and the same was approved by the committee.

3.12 Pilot Study

Pilot study was conducted to find out feasibility and practicality of the study. Duration of the pilot study was ten days. The pilot study was conducted in general and special wards of Sri Ramakrishna hospital, Coimbatore. True experimental posttest only control group design was adopted. Total enumerative sampling technique was used to select the samples and they were randomly assigned to experimental group (n=4) and control group (n=4).

Dry cold application was given for 3 minutes on the LMWH injection site to the experimental group. Injection LMWH was administered subcutaneously to the experimental and control group by the researcher. Posttest was done to assess the pain perception immediately after withdrawing needle, 4 hours, and 8 hours by using numerical pain rating scale and ecchymosis was assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale. Descriptive and inferential statistical methods were used for data analysis. Pain perception was analyzed immediately after withdrawing the needle, 4 hours and 8 hours ($t = 4.899$, 2.877 and 3.472 respectively, $d = 6$, $p<0.05$). Ecchymosis was analyzed after 48 hours and 72 hours ($t=4.931$ and 3.48 respectively, $df=6$, $p<0.05$). The result of pilot study revealed that dry cold application was effective in reducing pain perception and ecchymosis among patients receiving low molecular weight heparin. After pilot study the researcher was advised to do data analysis for each LMWH injection site separately in the main study because the pain perception and ecchymosis is different in each LMWH injection site and the same was adopted in the main study.

3.13 Procedure for Data Collection

The main study was conducted over a period of one month from 23.06.2015 to 19.07.2015 at Sri Ramakrishna Hospital, Coimbatore. Total enumerative sampling technique was used to select the samples. The 25 patients who met the sampling criteria were randomly assigned to experimental (n=13) and the control group (n=12). The demographic and clinical data was collected. Dry cold application was given for 3 minutes on LMWH injection site. Injection LMWH was administered

subcutaneously to the experimental and control group by the researcher. Dry cold application was given for 5 consecutive days. Posttest was done for both the experimental and control group to assess the pain perception immediately after withdrawing needle, 4 hours, and 8 hours by using numerical pain rating scale and ecchymosis was assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale.

3.14 Techniques of Data Analysis and Interpretation

Descriptive and inferential statistical techniques were used for data analysis. Descriptive statistics was applied for the analysis of demographic variables and clinical variables. The frequency tables were formulated for all significant information. Mean, Mean difference, Standard Deviation and Unpaired 't' test was used to find out the significance of pain perception and ecchymosis among patients receiving LMWH.

3.13.1 Unpaired 't' test

Unpaired 't' test was used to analyze the effect of dry cold application on pain perception and ecchymosis among patients receiving LMWH in control and experimental groups.

$$t = \frac{\bar{x} - \bar{y}}{SE}$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$SD = \sqrt{\frac{\sum\left(x - \bar{x}\right)^2 + \left(y - \bar{y}\right)^2}{n_1 + n_2 - 2}}$$

Where,

SD = standard deviation

SE = standard error

$\bar{x}$ = mean of the Experimental group (post test score)

$\bar{y}$ = mean of the Control group (post test score)

n_1 = number of samples in Experimental group

n_2 = number of samples in Control group

DATA ANALYSIS AND INTERPRETATION

This Chapter deals with the analysis and interpretation of data collected from 25 patients receiving low molecular weight heparin. The aim of the study was to determine the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin at selected hospital, Coimbatore. 25 patients were selected using total enumerative sampling technique. The total samples were randomly assigned to the experimental group (n=13) and the control group (n=12). Dry cold application was given for 3 minutes on the LMWH injection site for the experimental group. Injection LMWH was administered subcutaneously to the experimental group and control group. Pain perception was assessed by numerical pain rating scale and ecchymosis was assessed by transparent ruler scale. Descriptive and inferential statistical methods were employed to organize and analyze the data.

ORGANIZATION OF FINDINGS

Section I

Demographic variables of patients receiving low molecular weight heparin in experimental and control group.

Section II

Clinical variables of patients receiving low molecular weight heparin in experimental and control group.

Section III

Assessment on the level of pain perception after dry cold application among patients receiving low molecular weight heparin in experimental and control group.

Section IV

Assessment on the size of ecchymosis after dry cold application among patients receiving low molecular weight heparin in experimental and control group.

Section V

Effect of dry cold application on pain perception among patients receiving low molecular weight heparin in the experimental and control group.

Section VI

Effect of dry cold application on ecchymosis among patients receiving low molecular weight heparin in the experimental and control group.

Section I

4.1 Demographic Variables of Patients receiving Low Molecular Weight Heparin

This section includes the demographic variables collected from the patients receiving low molecular weight heparin. The demographic variables collected were age, gender, educational status, marital status, religion, and occupation.

Table 4.1.1
Age of Patients receiving LMWH

(n=25)

S. No	Age (in years)	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Below 30	1	7.69	1	8.33
2.	31-40	-	-	2	16.67
3.	41-50	3	23.08	1	8.33
4.	Above 51	9	69.23	8	66.67

The above table 4.1.1 depicts the age of patients receiving LMWH and the result shows that in the experimental group 9 (69.23%) patients were above 51 years, 3 (23.08%) patients were between the age group of 41 and 50 years, 1 (7.69%) patient was below 30 years. In the control group 8 (66.67%) patients were above 51 years, 2 (16.67%) patients were between the age group of 31 and 40 years, 1 (8.33%) patient was below 30 years and 41-50 years respectively. (Figure 4.1.1)

Table 4.1.2

Gender of Patients receiving LMWH

(n=25)

S. No	Gender	Experimental group (n=13)		Control group (n=12)	
		Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
1.	Male	10	76.92	6	50
2.	Female	3	23.08	6	50

The above table 4.1.2 depicts the gender of patients receiving LMWH and the result shows that in the experimental group 10 (76.92%) of patients were males, 3 (23.08%) of patients were females, and in the control group 6 (50%) of the patients were males and females respectively. (Figure 4.1.2)

Figure 4.1.1

Age of Patients receiving LMWH

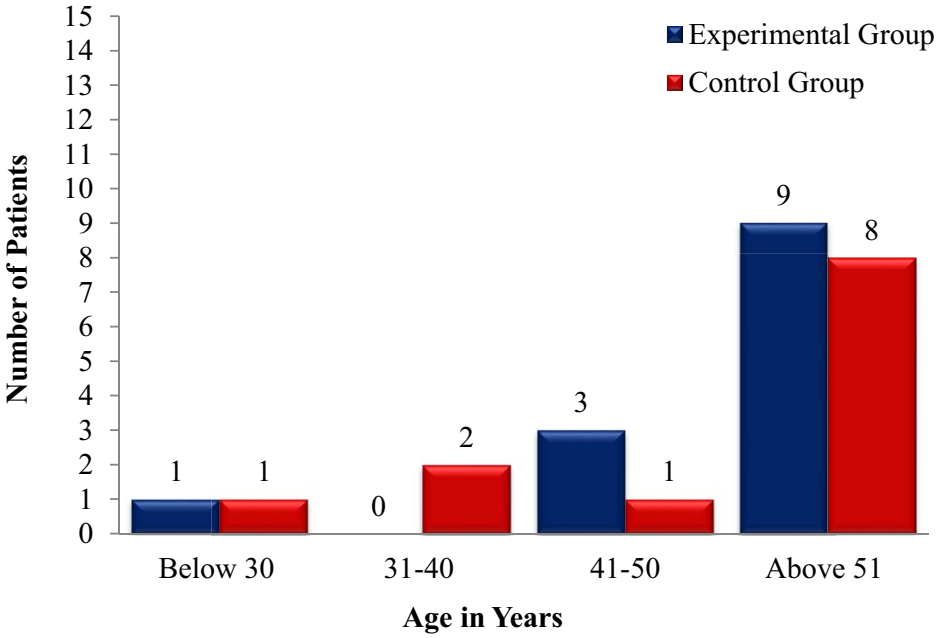


Figure 4.1.2

Gender of Patients receiving LMWH

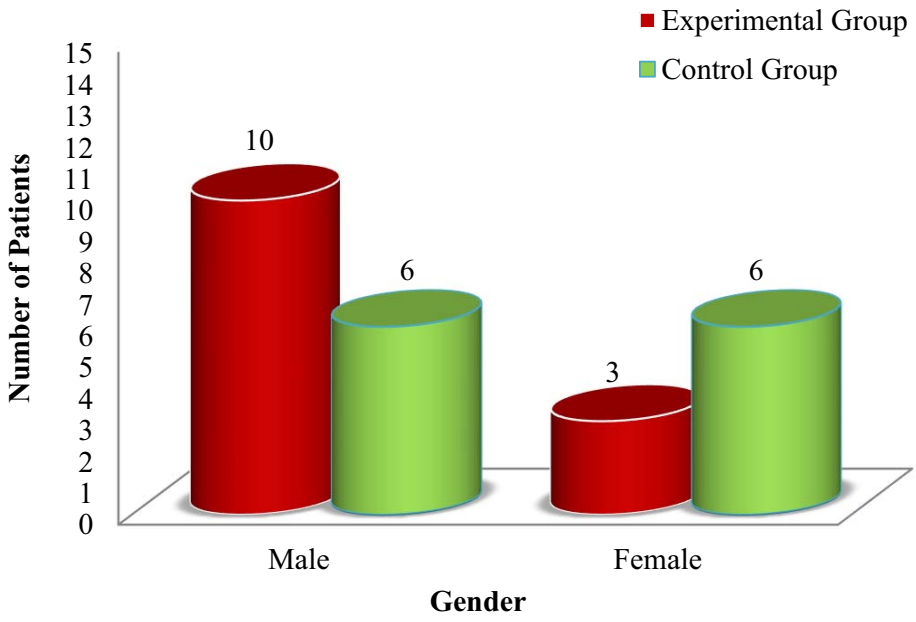


Table 4.1.3

Educational Status of Patients receiving LMWH

(n=25)

S. No	Educational status	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Illiterate	1	7.69	1	8.33
2.	Primary School	3	23.08	1	8.33
3.	High School	6	46.15	5	41.67
4.	Higher Secondary	3	23.08	3	25
5.	Graduate	-	-	2	16.67

The above table 4.1.3 depicts the educational status of patients receiving LMWH. The result shows that in the experimental group 3 (23.08%) patients had higher secondary education, 6 (46.15%) patients had high school education, 3 (23.08%) patients had primary school education, and 1 (7.69%) patient was illiterate. In the control group 2 (16.67%) patients were graduates, 3 (25%) patients had higher secondary education, 5 (41.67%) patients had high school education, 1 (8.33%) patient had primary school education, and 1 (8.33%) patient was illiterate. (Figure 4.1.3)

Table 4.1.4

Marital Status of Patients receiving LMWH

(n=25)

S. No	Marital status	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Single	1	7.69	1	8.33
2.	Married	11	84.62	9	75
3.	Widow	1	7.69	2	16.67

The above table 4.1.4 depicts the marital status of patients receiving LMWH reveals that in the experimental group 11 (84.62%) patients were married, 1 (7.69%) patient was single and 1 (7.69%) patient was widow. In the control group 9 (75%) patients were married, 2 (16.67%) patients were widows and 1 (8.33%) patient was single. (Figure 4.1.4)

Figure 4.1.3

Educational Status of Patients receiving LMWH

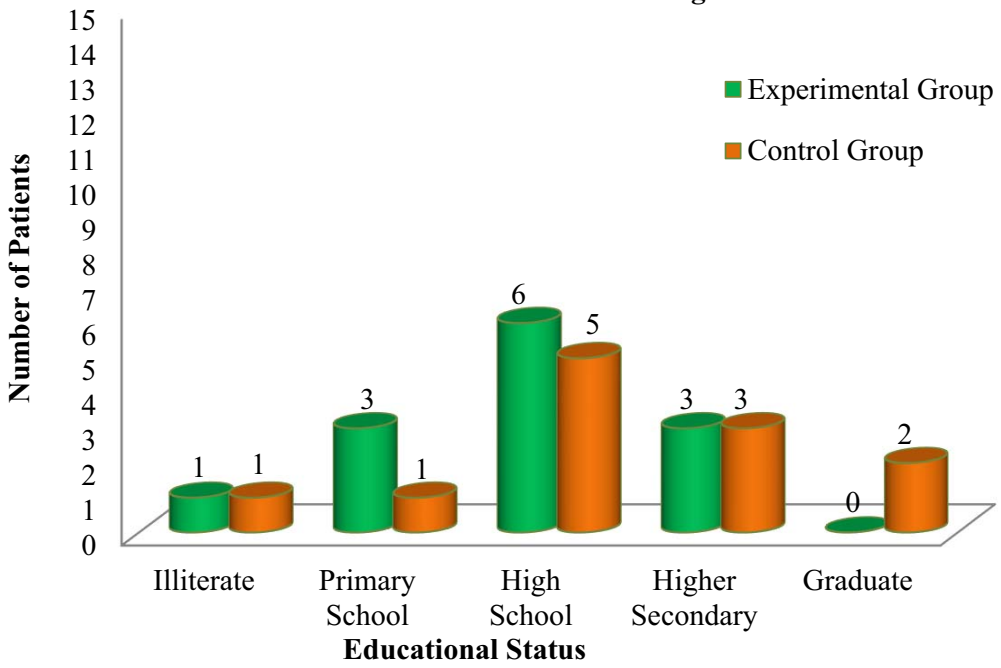


Figure 4.1.4

Marital Status of Patients receiving LMWH

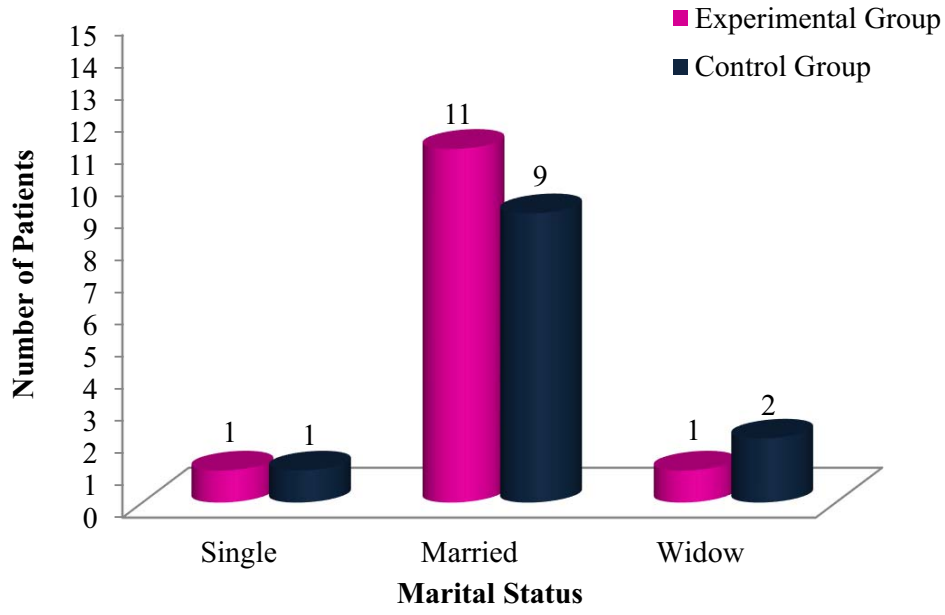


Table 4.1.5

Religion of Patients receiving LMWH

(n=25)

S. No	Religion	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Hindu	13	100	10	83.33
2.	Muslim	-	-	2	16.67

The above table 4.1.5 depicts the religion of patients receiving LMWH shows that majority of patients belonged to Hindu religion, 13 (100%) in experimental group and 10 (83.33%) in control group. (Figure 4.1.5)

Table 4.1.6

Occupation of Patients receiving LMWH

(n=25)

S. No	Occupation	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Employed	9	69.23	6	50
2.	Unemployed	4	30.77	6	50

The above table 4.1.6 depicts that the occupation of patients receiving LMWH shows that in the experimental group 9 (69.23%) patients were employed, 4 (30.77%) patients were unemployed and in the control group 6 (50%) patients were employed and unemployed respectively. (Figure 4.1.6)

Figure 4.1.5

Religion of Patients receiving LMWH

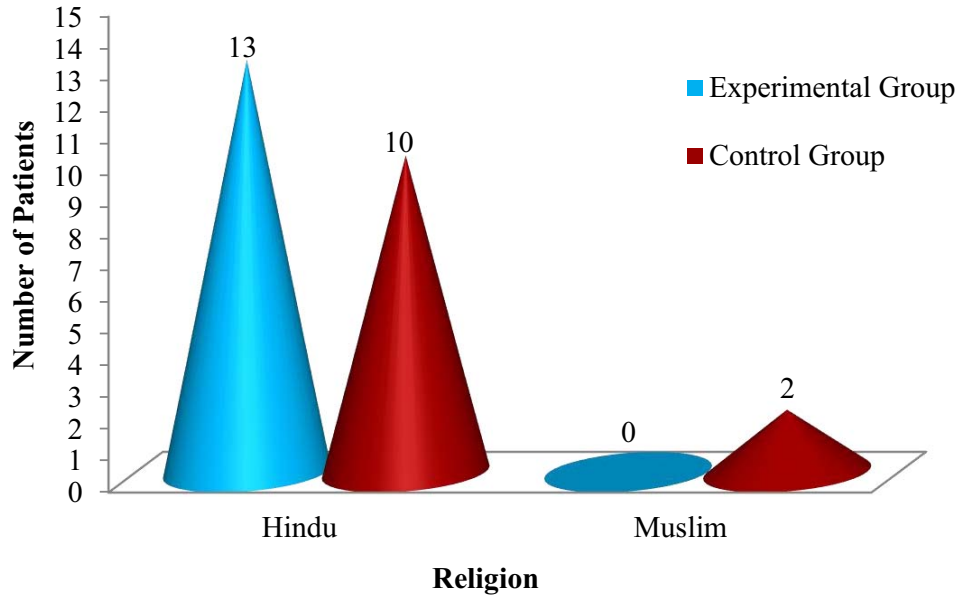
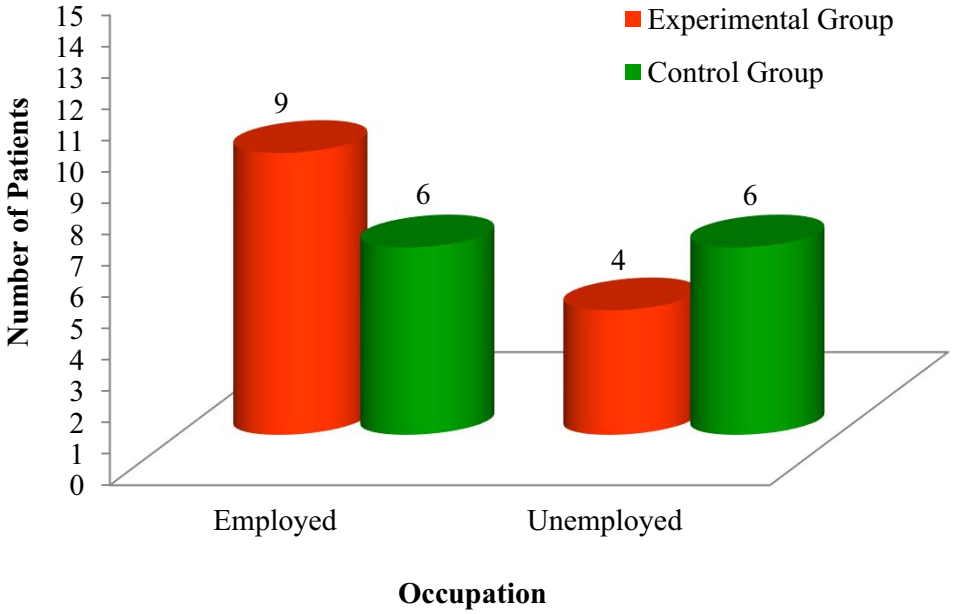


Figure 4.1.6

Occupation of Patients receiving LMWH



Section II

4.2 Clinical Variables of Patients receiving Low Molecular Weight Heparin

This section presents the clinical variables collected from the patients receiving low molecular weight heparin. The clinical variables are diagnosis of the patient, name of the injection and dose, frequency of injection and presence of any other illness.

Table 4.2.1

Diagnosis of Patients receiving LMWH

(n=25)

S. No	Diagnosis	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Cerebro Vascular Accident	10	76.92	8	66.67
2.	Deep Vein Thrombosis	1	7.69	1	8.33
3.	Cerebro Vascular Thrombosis	-	-	2	16.67
4.	Others	2	15.39	1	8.33

The above table 4.2.1 depicts the diagnosis of patients receiving LMWH reveals that in the experimental group 10 (76.92%) patients were diagnosed with CVA (Cerebro Vascular Accident), 2 (15.39%) patients were diagnosed with other diseases such as autoimmune encephalitis, seizure disorder, 1 (7.69%) patient was diagnosed with DVT (Deep Vein Thrombosis) and in the control group 8 (66.67%) patients were diagnosed with CVA, 2 (16.67%) patients were diagnosed with CVT (Cerebro Vascular Thrombosis), 1 (8.33%) patients were diagnosed with deep vein thrombosis, 1 (8.33%) patient were diagnosed with hepatoma. (Figure 4.2.1)

Table 4.2.2

Name of Injection LMWH received by Patients

(n=25)

S. No	Name of the injection	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Inj. Lupenox 40 mg	2	15.39	1	8.33
2.	Inj. Flothin 40 mg	8	61.53	8	66.67
3.	Inj. Enox 40 mg	1	7.69	2	16.67
4.	Inj. Clexane 40 mg	2	15.39	1	8.33

The above table 4.2.2 depicts that name of injection LMWH received by patients shows that in the experimental group 8 (61.53%) patients received Inj. Flothin 40 mg, 2 (15.39%) patients received Inj. Lupenox 40 mg and Inj. Clexane 40 mg respectively, 1 (7.69%) patient received Inj. Enox 40 mg and in the control group 8 (66.67%) patients received Inj. Flothin 40 mg, 2 (16.67%) patients received Inj. Enox 40 mg, 1 (8.33%) patient received Inj. Lupenox 40 mg and Inj. Clexane 40 mg respectively. (Figure 4.2.2)

Table 4.2.3

Presence of Any Other Illness among Patients receiving LMWH

(n=25)

S. No	Any other illness	Experimental group (n=13)		Control group (n=12)	
		Frequency	Percentage (%)	Frequency	Percentage (%)
1.	Present	10	76.92	6	50
2.	Absent	3	23.08	6	50

The above table 4.2.3 depicts that in the presence of any other illness among patients receiving LMWH reveals that in the experimental group 10 (76.92%) patients had other illness, 3 (23.08%) patients had no other illness and in the control group 6 (50%) patients had other illness, 6 (50%) patients had no other illness such as DM (Diabetes Mellitus), SHT (Systemic Hypertension), IHD (Ischemic Heart Disease), CHF (Congestive Heart Failure), CRF (Chronic Renal Failure), PVD (Peripheral Vascular Disease) etc. (Figure 4.2.3)

Figure 4.2.1

Diagnosis of Patients receiving LMWH

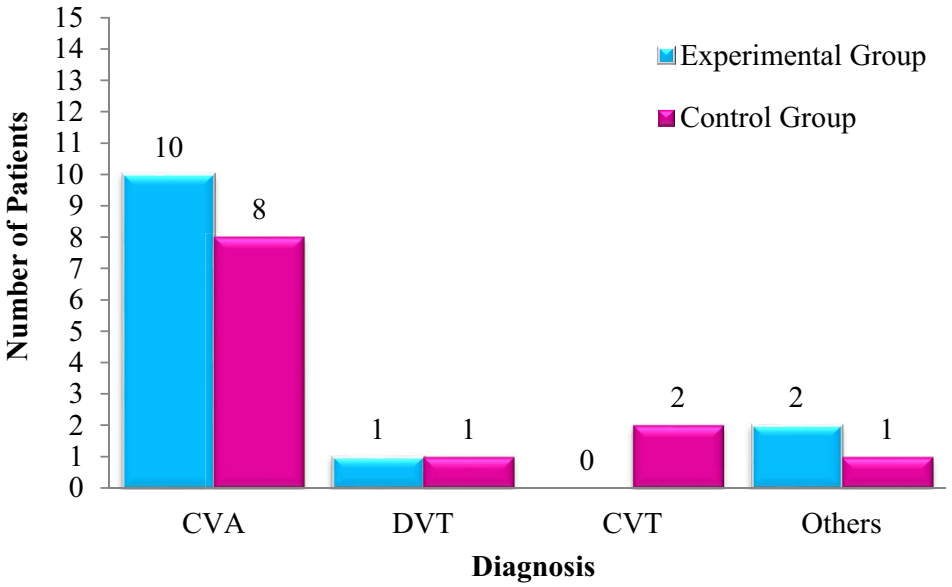


Figure 4.2.2

Name of Injection LMWH received by Patients

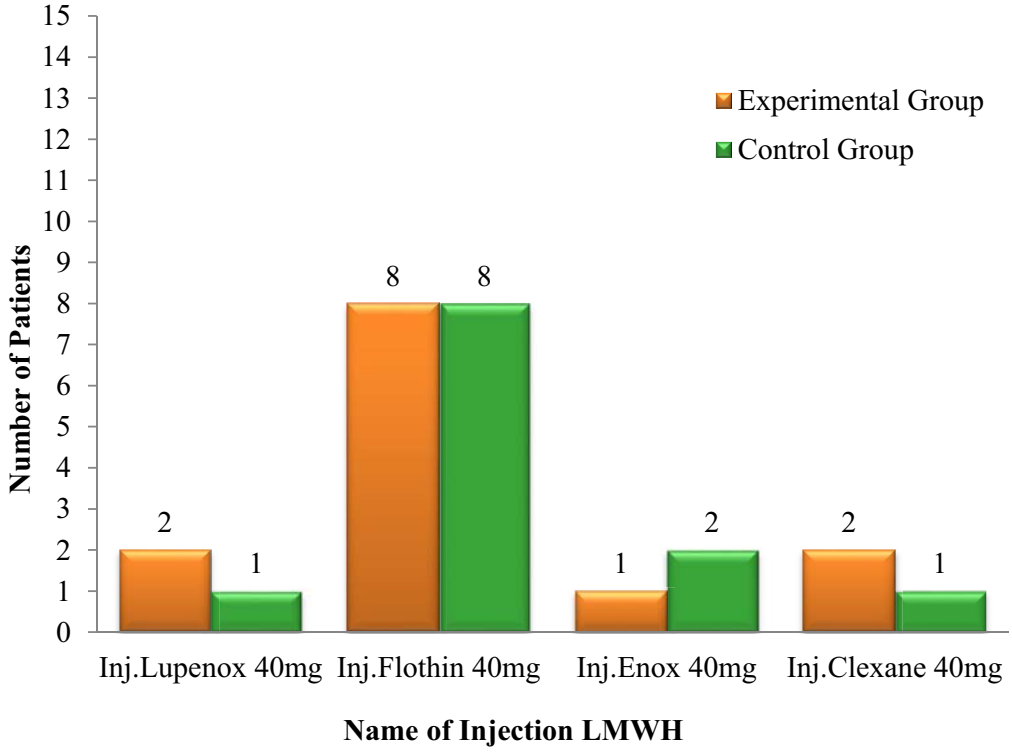
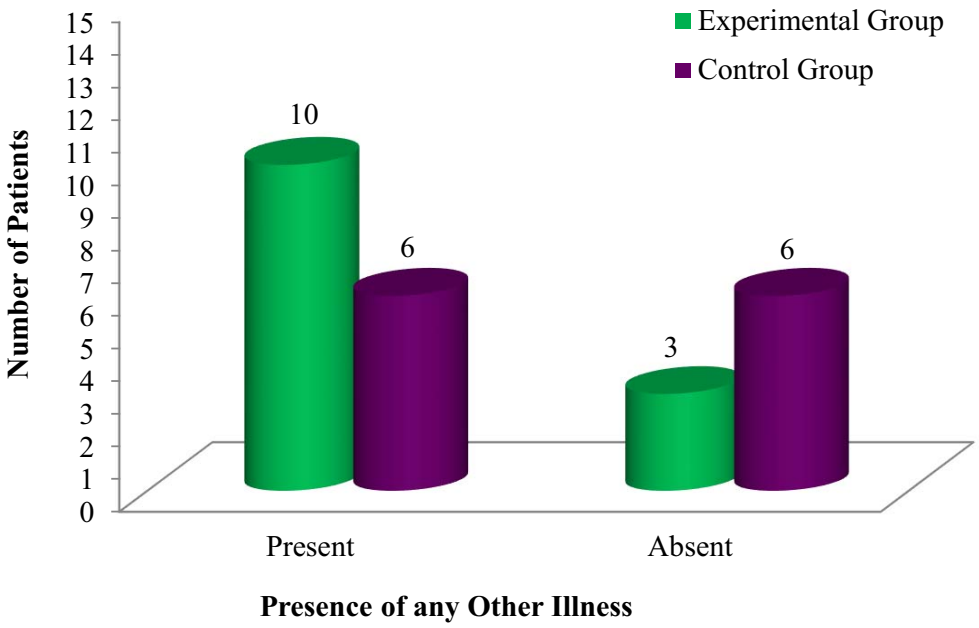


Figure 4.2.3

Presence of Any Other Illness among Patients receiving LMWH



Section III

4.3 Assessment on the Level of Pain Perception after Dry Cold Application among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group

This section deals with the analysis and interpretation assessment on the level of pain perception after dry cold application among patients receiving low molecular weight heparin. The pain perception was assessed immediately after withdrawing needle, 4 hours, and 8 hours in the right upper outer arm, left upper outer arm, right thigh and left thigh by using numerical pain rating scale was categorized as no pain, mild pain, moderate pain, severe pain, unbearable pain.

Table 4.3.1

Level of Pain Perception among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group (Right Upper Outer Arm)

(n=25)

S. No	Pain perception	Right Upper Outer Arm											
		Experimental group (n=13)						Control group (n=12)					
		Immediately after withdrawing needle		After 4 Hours		After 8 Hours		Immediately after with-drawing needle		After 4 Hours		After 8 Hours	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1.	No Pain	-	-	13	100	13	100	-	-	4	33.33	6	50
2.	Mild Pain	13	100	-	-	-	-	-	-	8	66.67	6	50
3.	Moderate Pain	-	-	-	-	-	-	8	66.67	-	-	-	-
4.	Severe Pain	-	-	-	-	-	-	4	33.33	-	-	-	-
5.	Unbearable Pain	-	-	-	-	-	-	-	-	-	-	-	-

The above table 4.3.1 depicts the level of pain perception among patients receiving low molecular weight heparin in experimental group and control group (right upper outer arm), shows that in the experimental group immediately after withdrawing needle 13 (100%) patients had mild pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in the control group immediately after withdrawing needle 8 (66.67%) patients had moderate pain and 4 (33.33%) had severe pain, after 4 hours, 8 (66.67%) patients had mild pain, 4 (33.33 %) patients had no pain, and after 8 hours 6 (50%) patients had no pain and mild pain respectively. (Figure 4.3.1.1 and Figure 4.3.1.2)

Figure 4.3.1.1

Level of Pain Perception among Patients receiving LMWH in Experimental Group (Right Upper Outer Arm)

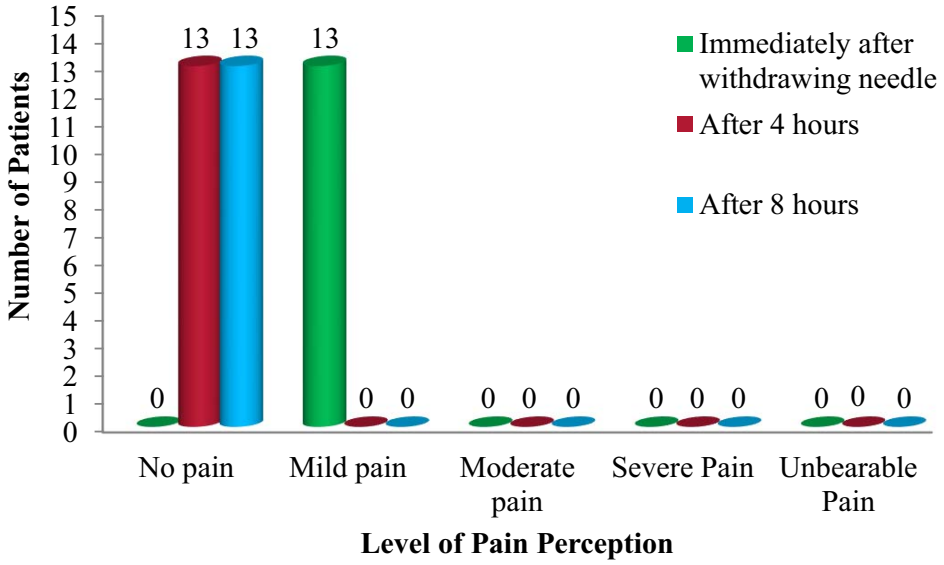


Figure 4.3.1.2

Level of Pain Perception among Patients receiving LMWH in Control Group (Right Upper Outer Arm)

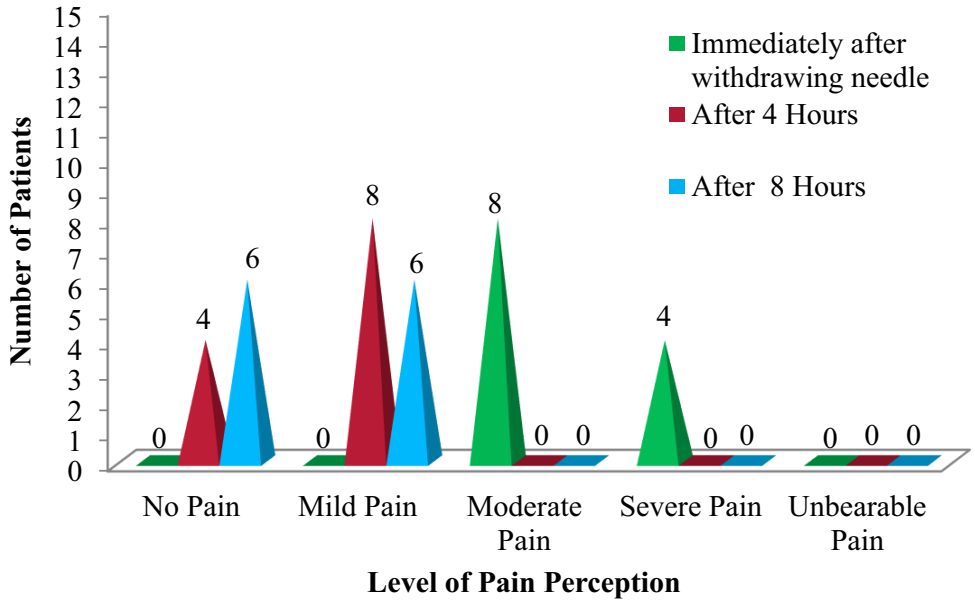


Table 4.3.2

Level of Pain Perception among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group (Left Upper Outer Arm) (n=25)

S. No	Pain perception	Left Upper Outer Arm											
		Experimental group (n=13)						Control group (n=12)					
		Immediately after withdrawing needle		After 4 hours		After 8 hours		Immediately after withdrawing needle		After 4 Hours		After 8 Hours	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1.	No Pain	-	-	13	100	13	100	-	-	2	16.67	7	58.33
2.	Mild Pain	12	92.31	-	-	-	-	-	-	10	83.33	5	41.67
3.	Moderate Pain	1	7.69	-	-	-	-	8	66.67	-	-	-	-
4.	Severe Pain	-	-	-	-	-	-	3	25	-	-	-	-
5.	Unbearable Pain	-	-	-	-	-	-	1	8.33	-	-	-	-

The above table 4.3.2 depicts the level of pain perception among patients receiving low molecular weight heparin in experimental group and control group (left upper outer arm) and the results shows that in experimental group immediately after withdrawing needle 12 (92.31%) patients had mild pain and 1 (7.69%) patient had moderate pain, after 4 hours and 8 hours 13 (100%) of patients had no pain respectively, whereas in control group immediately after withdrawing needle 8 (66.67%) patients had moderate pain and 3 (25%) patients had severe pain and 1 (8.33%) patient had unbearable pain, after 4 hours, 10 (83.33%) patients had mild pain, 2 (16.67%) patients had no pain, and after 8 hours 7 (58.33%) patients had no pain, 5 (41.67%) patients had mild pain. (Figure 4.3.2.1 and figure 4.3.2.2)

Figure 4.3.2.1

Level of Pain Perception among Patients receiving LMWH in Experimental Group (Left Upper Outer Arm)

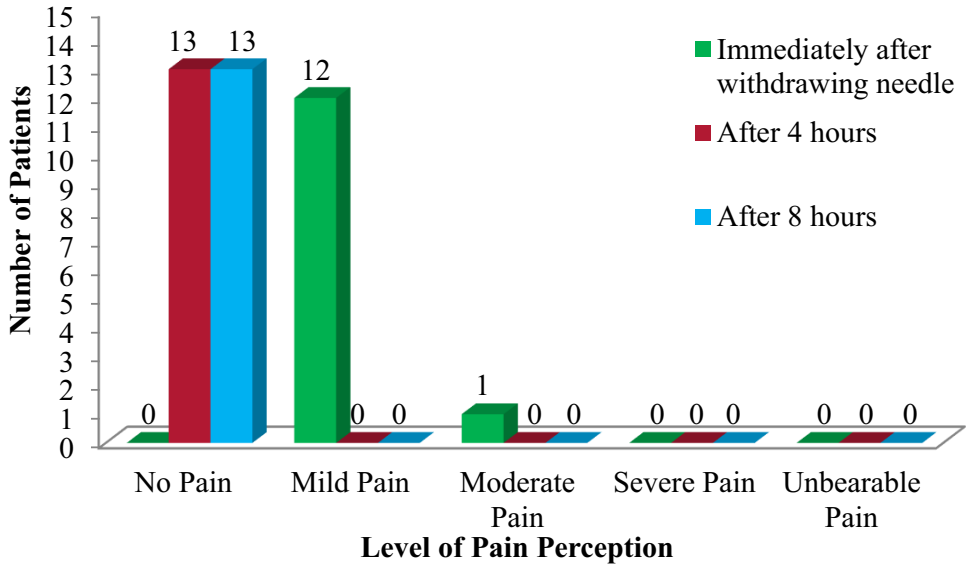


Figure 4.3.2.2

Level of Pain Perception among Patients receiving LMWH in Control Group (Left Upper Outer Arm)

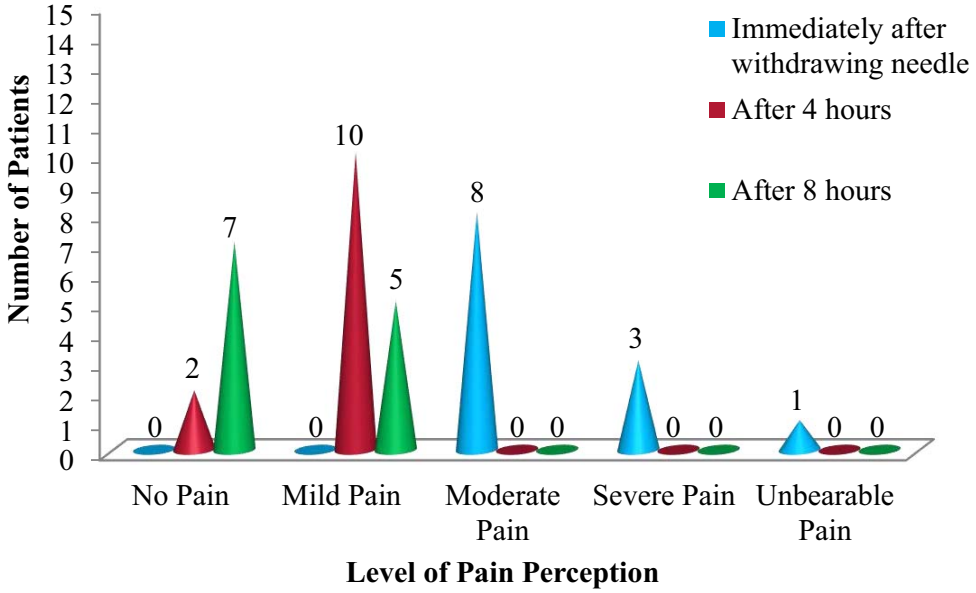


Table 4.3.3

Level of Pain Perception among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group (Right Thigh)

(n=25)

S. No	Pain perception	Right Thigh											
		Experimental group (n=13)						Control group (n=12)					
		Immediately after withdrawing needle		After 4 Hours		After 8 Hours		Immediately after withdrawing needle		After 4 Hours		After 8 Hours	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1.	No Pain	5	38.46	13	100	13	100	-	-	5	41.67	9	75
2.	Mild Pain	7	53.85	-	-	-	-	-	-	7	58.33	3	25
3.	Moderate Pain	1	7.69	-	-	-	-	10	83.33	-	-	-	-
4.	Severe Pain	-	-	-	-	-	-	2	16.67	-	-	-	-
5.	Unbearable Pain	-	-	-	-	-	-	-	-	-	-	-	-

The above table 4.3.3 depicts the level of pain perception among patients receiving low molecular weight heparin in experimental group and control group (right thigh) and the results shows that in experimental group immediately after withdrawing needle 7 (53.85%) patients had mild pain, 5 (38.46%) patients had no pain, and 1 (7.69%) patient had moderate pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in control group immediately after withdrawing needle 10 (83.33%) patients had moderate pain and 2 (16.67%) patients had severe pain, after 4 hours 7 (58.33%) patients had mild pain, 5 (41.67%) patients had no pain and after 8 hours 9 (75%) patients had no pain, 3 (25%) patients had mild pain. (Figure 4.3.3.1 and Figure 4.3.3.2)

Figure 4.3.3.1

Level of Pain Perception among Patients receiving LMWH in Experimental Group (Right Thigh)

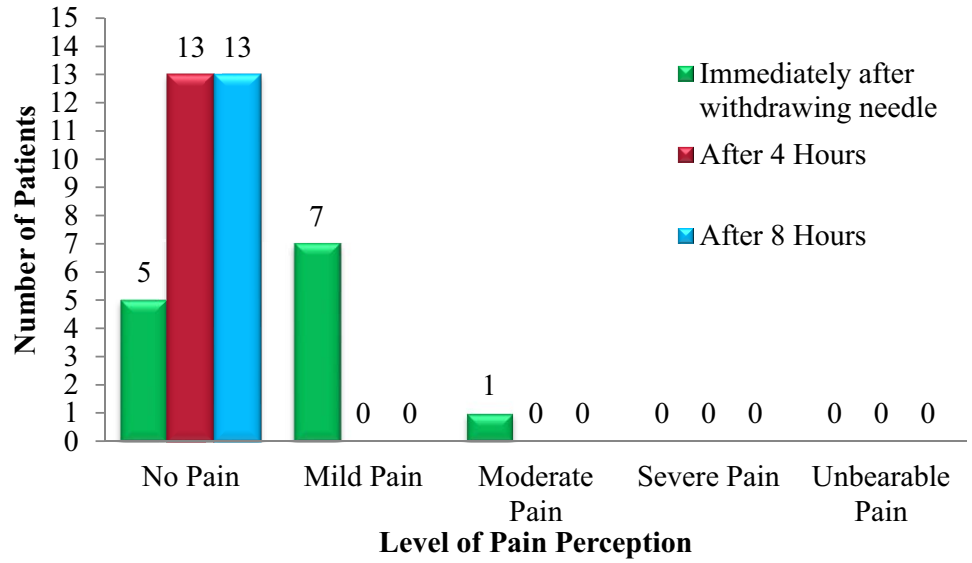


Figure 4.3.3.2

Level of Pain Perception Pain Perception among Patients receiving LMWH in Control Group (Right Thigh)

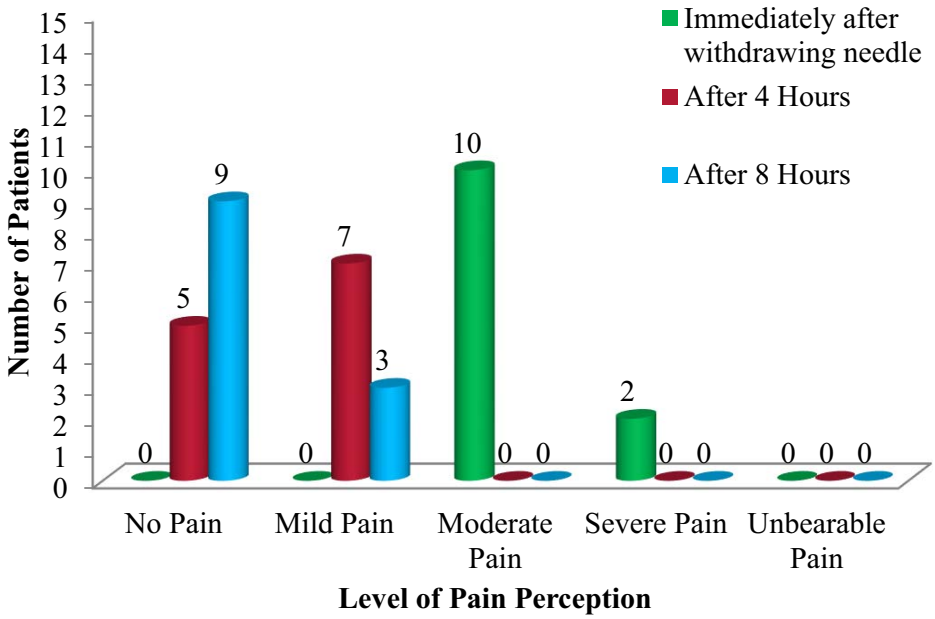


Table 4.3.4

Level of Pain Perception among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group (Left Thigh)

(n=25)

S. No	Pain perception	Left Thigh											
		Experimental group (n=13)						Control group (n=12)					
		Immediately after withdrawing needle		After 4 Hours		After 8 Hours		Immediately after withdrawing needle		After 4 Hours		After 8 Hours	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1.	No Pain	3	23.08	13	100	13	100	-	-	2	16.67	7	58.33
2.	Mild Pain	8	61.54	-	-	-	-	-	-	10	83.33	5	41.67
3.	Moderate Pain	2	15.38	-	-	-	-	6	50	-	-	-	-
4.	Severe Pain	-	-	-	-	-	-	6	50	-	-	-	-
5.	Unbearable Pain	-	-	-	-	-	-	-	-	-	-	-	-

The above table 4.3.4 depicts the level of pain perception among patients receiving low molecular weight heparin in experimental group and control group (left thigh) and the results shows that in experimental group immediately after withdrawing needle, 8 (61.54%) patients had mild pain, 3 (23.08%) patients had no pain and 2 (15.38%) patients had moderate pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in control group immediately after withdrawing needle 6 (50%) patients had moderate pain and severe pain respectively, after 4 hours 10 (83.33%) patients had mild pain, 2 (16.67%) patients had no pain, and after 8 hours 7 (58.33%) patients had no pain, 5 (41.67%) patients had mild pain. (Figure 4.3.4.1 and Figure 4.3.4.2)

Figure 4.3.4.1

Level of Pain Perception among Patients receiving LMWH in Experimental Group (Left Thigh)

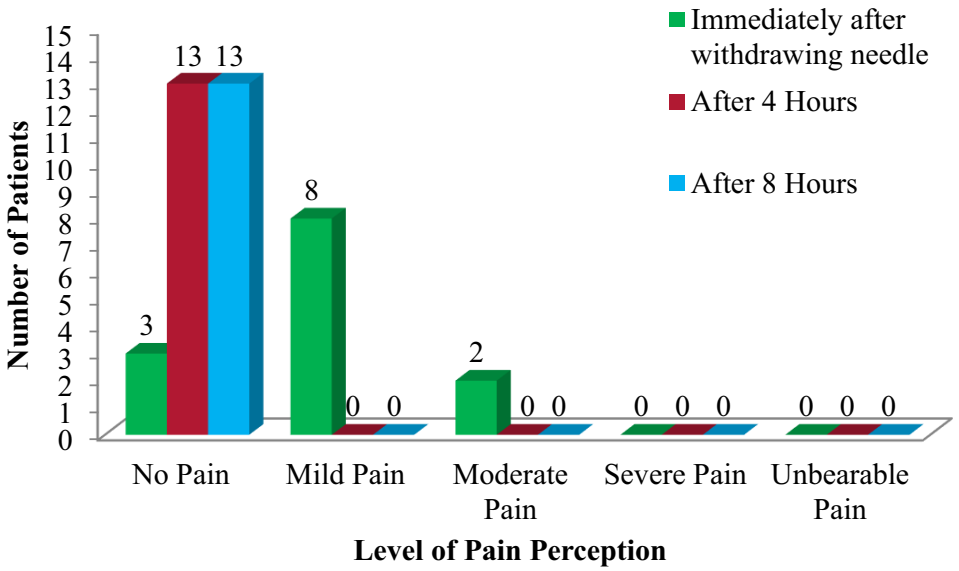
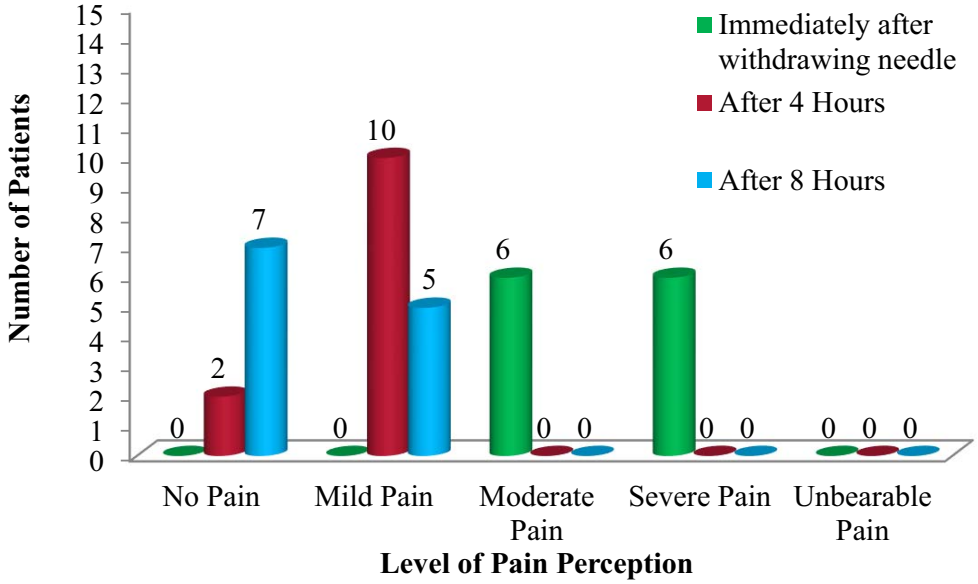


Figure 4.3.4.2

Level of Pain Perception among Patients receiving LMWH in Control Group (Left Thigh)



Section IV

4.4 Assessment on the Size of Ecchymosis after Dry Cold Application among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group

This section deals with the analysis and interpretation assessment on the size of ecchymosis after dry cold application among patients receiving low molecular weight heparin. In right upper outer arm, left upper outer arm, right thigh and left thigh, the ecchymosis was assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale.

Table 4.4.1

Size of Ecchymosis among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group (Right Upper Outer Arm)

(n=25)

S. No	Ecchymosis (cm^2)	Right Upper Outer Arm							
		Experimental Group (n=13)				Control Group (n=12)			
		48 hours		72 hours		48 hours		72 hours	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1.	0 - 0.5	13	100	13	100	9	75	8	66.67
2.	0.6 - 1.0	-	-	-	-	2	16.67	2	16.67
3.	1.1 - 1.5	-	-	-	-	1	8.33	1	8.33
4.	1.6 - 2.0	-	-	-	-	-	-	-	-
5.	2.1 - 2.5	-	-	-	-	-	-	-	-
6.	2.6 - 3.0	-	-	-	-	-	-	1	8.33

The above table 4.4.1 depicts the size of ecchymosis among patients receiving low molecular weight heparin in experimental group and control group (right upper outer arm), the results shows that in the experimental group after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2, whereas in the control group after 48 hours, 9 (75%) patients had ecchymosis measuring 0-0.5 cm^2, 2 (16.67%) patients had ecchymosis measuring 0.6 -1.0 cm^2 and 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and after 72 hours, 8 (66.67%) patients had ecchymosis measuring 0-0.5 cm^2, 2 (16. 67%) patients had ecchymosis measuring 0.6 -1.0 cm^2 and 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and 2.6- 3.0 cm^2. (Figure 4.4.1.1 and 4.4.1.2)

Figure 4.4.1.1

Size of Ecchymosis among Patients receiving LMWH in Experimental Group (Right Upper Outer Arm)

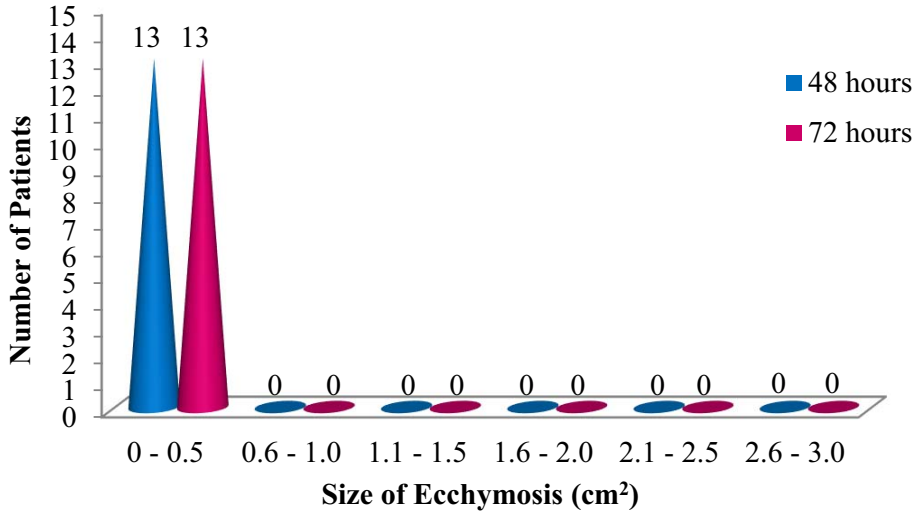


Figure 4.4.1.2

Size of Ecchymosis among Patients receiving Low Molecular Weight Heparin in Control Group (Right Upper Outer Arm)

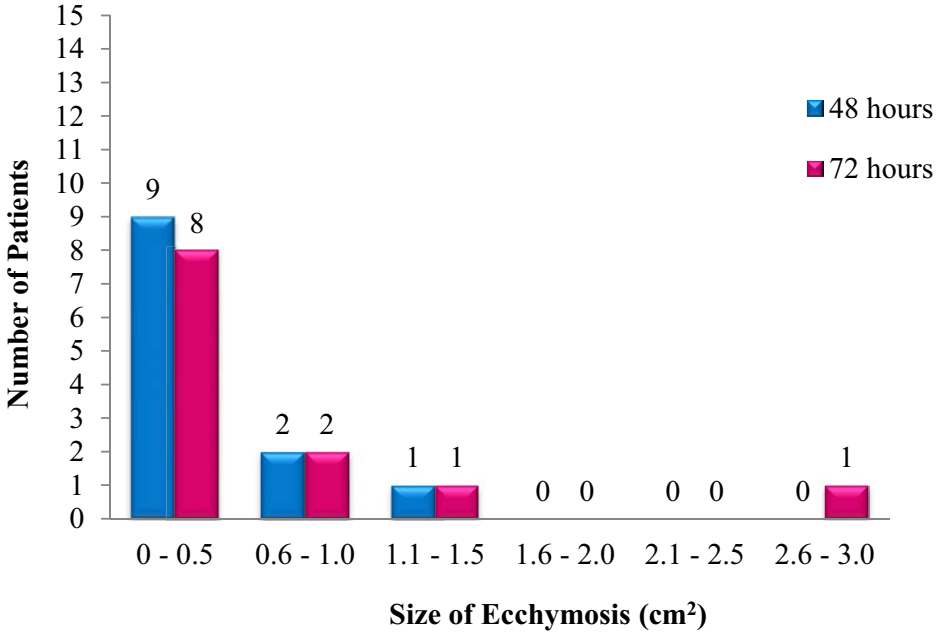


Table 4.4.2

Assessment on the Size of Ecchymosis among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group (Left Upper Outer Arm)

(n=25)

S. No	Ecchymosis (cm^2)	Left Upper Outer Arm							
		Experimental Group (n=13)				Control Group (n=12)			
		48 hours		72 hours		48 hours		72 hours	
		Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
1.	0 - 0.5	13	100	13	100	10	83.34	8	66.67
2.	0.6 - 1.0	-	-	-	-	-	-	2	16.67
3.	1.1 - 1.5	-	-	-	-	1	8.33	1	8.33
4.	1.6 - 2.0	-	-	-	-	1	8.33	-	-
5.	2.1 - 2.5	-	-	-	-	-	-	-	-
6.	2.6 - 3.0	-	-	-	-	-	-	1	8.33

The above table 4.4.2 depicts the size of ecchymosis among patients receiving low molecular weight heparin in experimental group and control group (left upper outer arm), the results shows that in the experimental group after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2, whereas in the control group after 48 hours, 10 (83.34%) patients had ecchymosis measuring 0-0.5 cm^2, 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and 1.6 -2.0 cm^2 respectively and after 72 hours, 8 (66.67%) patients had ecchymosis measuring 0-0.5 cm^2, 2 (16.67%) patients had ecchymosis measuring 0.6 -1.0 cm^2 and 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and 2.6- 3.0 cm^2. (Figure 4.4.2.1 and Figure 4.4.2.2)

The ecchymosis among patients receiving low molecular weight heparin in experimental group and control group on right and left thigh, the results shows that in the experimental group and control group after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2.

Figure 4.4.2.1

Size of Ecchymosis among Patients receiving LMWH in Experimental Group (Left Upper Outer Arm)

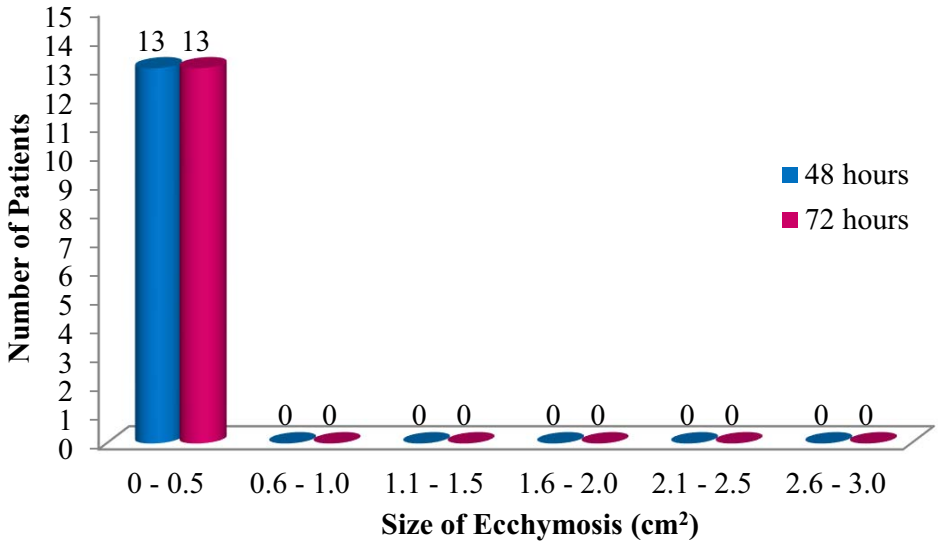
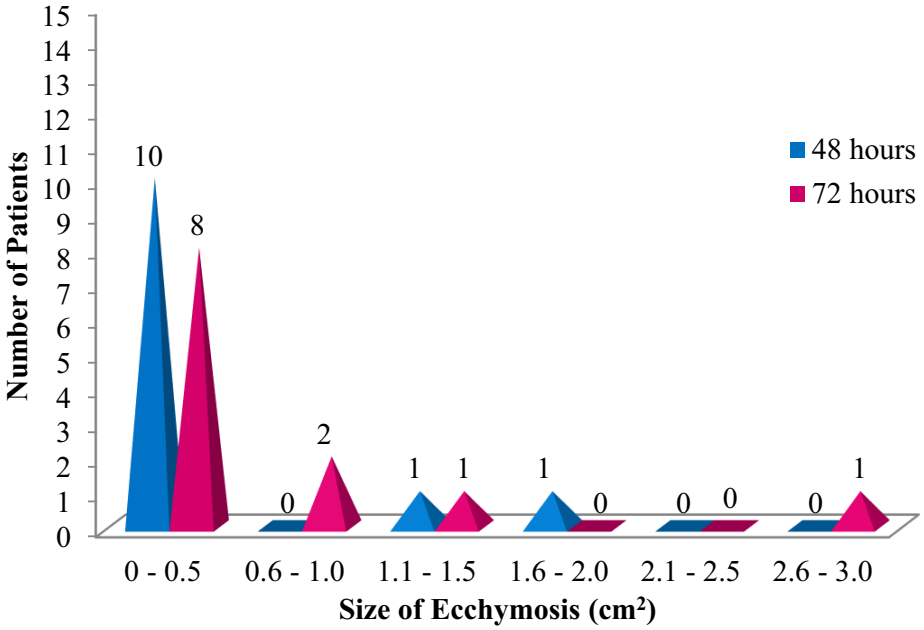


Figure 4.4.2.2

Size of Ecchymosis among Patients receiving LMWH in Control Group (Left Upper Outer Arm)



Section V

4.5 Effect of Dry Cold Application on Pain Perception among Patients receiving Low Molecular Weight Heparin in the Experimental Group and Control Group

This section deals with the analysis and interpretation on effect of dry cold application on pain perception among patients receiving low molecular weight heparin. The pain perception was assessed immediately after withdrawing needle, 4 hours, and 8 hours in the right upper outer arm, left upper outer arm, right thigh and left thigh, by using numerical pain rating scale.

Table 4.5.1

Comparison on the Effect of Dry Cold Application on Pain Perception among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group

Pain Perception		Group	Mean	SD	Mean difference	't' value
Right Upper Outer Arm	Immediately after withdrawing needle	Experimental Group	1.462	0.812	3.897	10.667*
		Control Group	5.359	0.938		
	After 4 Hours	Experimental Group	0	0	0.693	3.808*
		Control Group	0.693	0.63		
	After 8 Hours	Experimental Group	0	0	0.222	3.083*
		Control Group	0.222	0.249		
Left Upper Outer Arm	Immediately after withdrawing needle	Experimental Group	1.667	0.995	4.221	9.058*
		Control Group	5.888	1.235		
	After 4 Hours	Experimental Group	0	0	0.916	4.468*
		Control Group	0.916	0.708		
	8 Hours	Experimental Group	0	0	0.306	2.684*
		Control Group	0.306	0.397		
Right Thigh	Immediately after withdrawing needle	Experimental Group	1.231	1.137	4.019	8.023*
		Control Group	5.25	1.267		
	After 4 Hours	Experimental Group	0	0	0.708	2.878*
		Control Group	0.708	0.853		
	After 8 Hours	Experimental Group	0	0	0.375	2.232*
		Control Group	0.375	0.582		

Pain Perception		Group	Mean	SD	Mean difference	't' value
Left Thigh	Immediately after withdrawing needle	Experimental Group	1.346	1.182	4.487	8.798*
		Control Group	5.833	1.264		
	After 4 Hours	Experimental Group	0	0	1.208	5.207*
		Control Group	1.208	0.802		
	After 8 Hours	Experimental Group	0	0	0.292	2.679*
		Control Group	0.292	0.379		

*Significant at 0.05 level

Unpaired 't' test was used to compare the effect of dry cold application on pain perception among patients receiving LMWH in experimental and control groups.

The pain perception was assessed in right upper outer arm, immediately after withdrawing needle, the mean score and standard deviation of experimental group was 1.462 and 0.812 respectively, and control group was 5.359 and 0.938 respectively with the mean difference of 3.897, and after 4 hours, the mean score and standard deviation of experimental group was 0 and control group was 0.693 and 0.63 respectively with the mean difference of 0.693 and after 8 hours, the mean score and standard deviation of experimental group was 0 and control group was 0.222 and 0.249 respectively with the mean difference of 0.222. Calculated ‘t’ value immediately after withdrawing the needle, 4 hours, and 8 hours were 10.667, 3.808 and 3.083 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH on right upper outer arm in the experimental and control group.

The pain perception was assessed in left upper outer arm, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 1.667 and 0.995 respectively, and control group was 5.888 and 1.235 respectively with the mean difference of 4.221, and after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group was 0.916 and 0.708 respectively with the mean difference of 0.916, and after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group was 0.306 and 0.397 respectively with the mean difference of 0.306. Calculated 't' value immediately after withdrawing the needle, 4 hours, and 8 hours were 9.058, 4.468, and 2.684 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH on left upper outer arm in the experimental and control group.

The pain perception was assessed in right thigh, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 1.231 and 1.137 respectively, and control group was 5.25 and 1.267 respectively with the mean difference of 4.019, and after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0, and control group was 0.708 and 0.853 respectively with the mean difference of 0.708, and after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0, and control group was 0.375 and 0.582 respectively with the mean difference of 0.375. Calculated 't' value immediately after withdrawing the needle, 4 hours, and 8 hours were 8.023, 2.878, and 2.232 respectively which was greater than the table value (t_v= 2.07, df=23) at

0.05 level of significance. Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH on right thigh in the experimental and control group.

The pain perception was assessed in left thigh, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 1.346 and 1.182 respectively, and control group was 1.833 and 1.264 respectively with the mean difference of 4.487, and after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0, and control group was 1.208 and 0.802 respectively with the mean difference of 1.208, and 8 hours it was identified that, the mean score and standard deviation of experimental group was 0, control group was 0.292 and 0.379 respectively with the mean difference of 0.292. Calculated 't' value immediately after withdrawing the needle, 4 hours, and 8 hours were 8.798, 5.207 and 2.679 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH on left thigh in the experimental and control group. (Figure 4.5.1.1, Figure 4.5.1.2, Figure 4.5.1.3 and Figure 4.5.1.4)

Figure 4.5.1.1

Comparison on the Effect of Dry Cold Application on Pain Perception among Patients receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm)

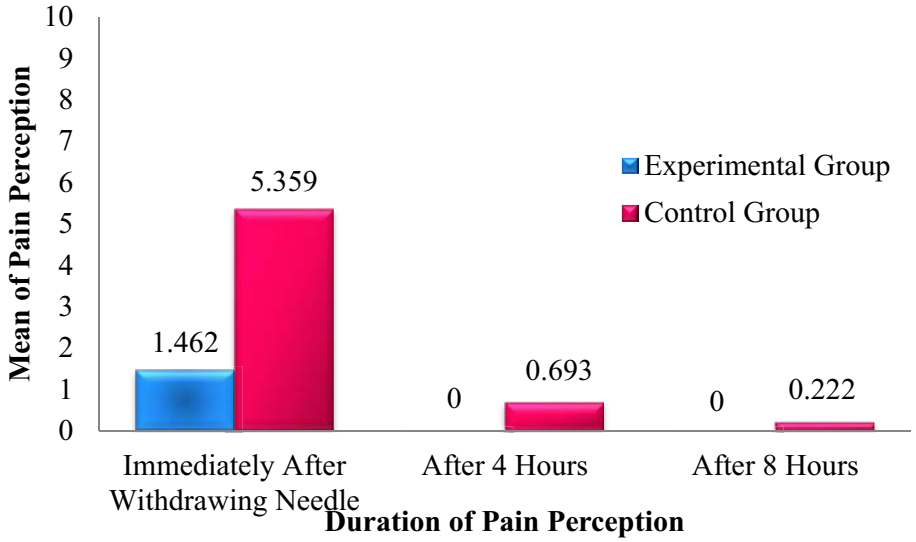


Figure 4.5.1.2

Comparison on the Effect of Dry Cold Application on Pain Perception among Patients receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm)

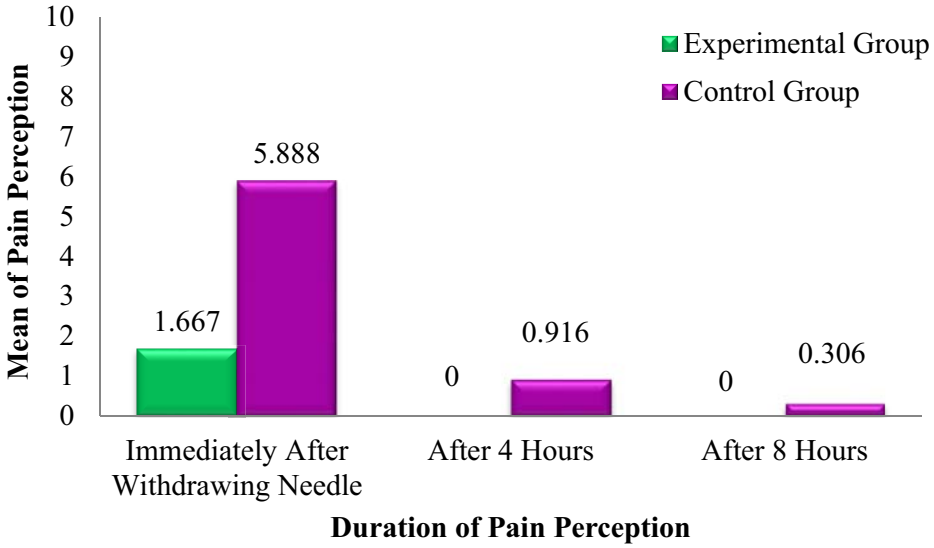


Figure 4.5.1.3

Comparison on the Effect of Dry Cold Application on Pain Perception among Patients receiving LMWH in Experimental Group and Control Group (Right Thigh)

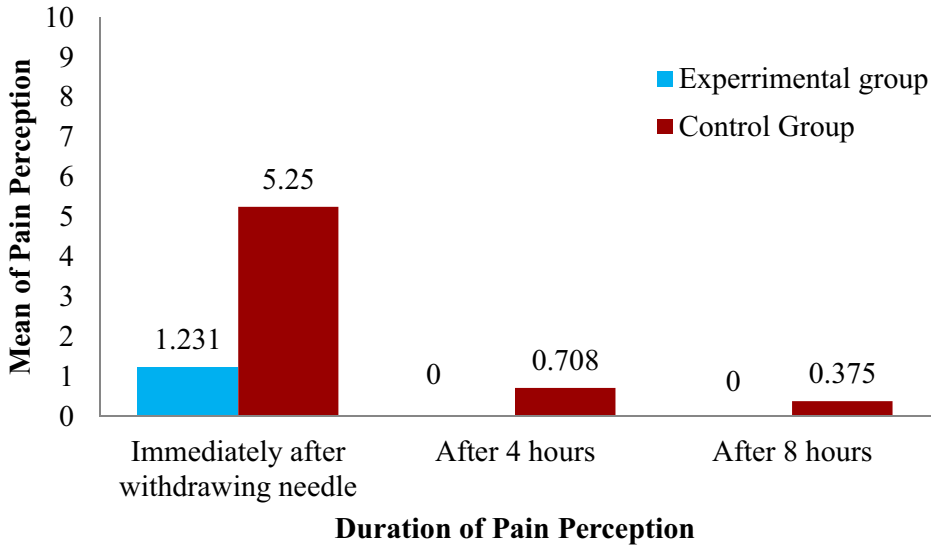


Figure 4.5.1.4

Comparison on the Effect of Dry Cold Application on Pain Perception among Patients receiving LMWH in Experimental Group and Control Group (Left Thigh)

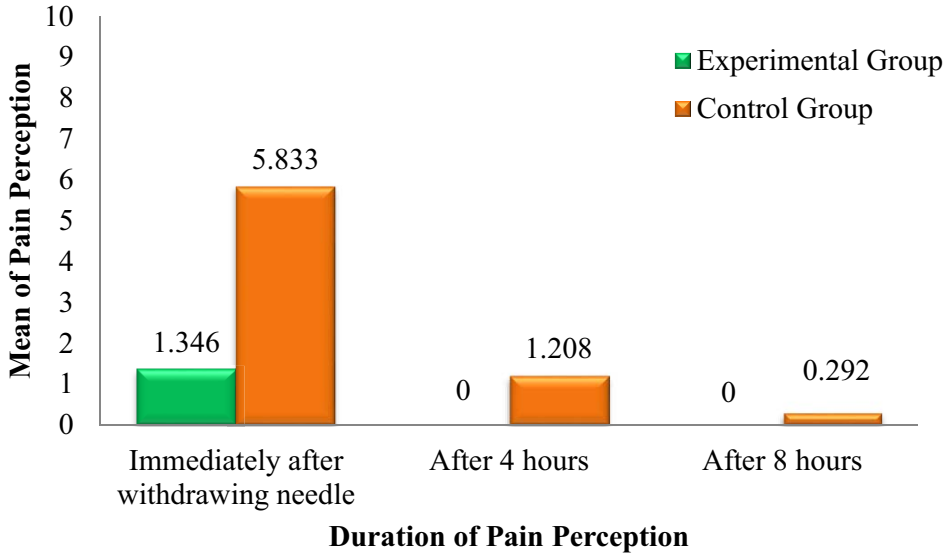


Table 4.5.2

Effect of Dry Cold Application on Pain Perception among Patients receiving Low Molecular Weight Heparin in the Experimental Group and Control Group

S. No	Pain Perception	Group	Mean	SD	Mean difference	't' value
1.	**Immediately after withdrawing needle**	Experimental Group	0.439	0.555	1.422	2.205*
		Control Group	1.861	2.155		
2.	**After 4 Hours**	Experimental Group	0	0	0.294	2.827*
		Control Group	0.294	0.359		
3.	**After 8 Hours**	Experimental Group	0	0	0.099	2.912*
		Control Group	0.099	0.119		

*Significant at 0.05 level

The above table 4.5.2 depicts the mean values of each sites (right upper outer arm, left upper outer arm, right thigh and left thigh), of pain perception, immediately after withdrawing needle, 4 hours and 8 hours in the experimental and control group. Unpaired 't' test was used to analyze the effect of dry cold application on pain perception among patients receiving LMWH in experimental and control groups.

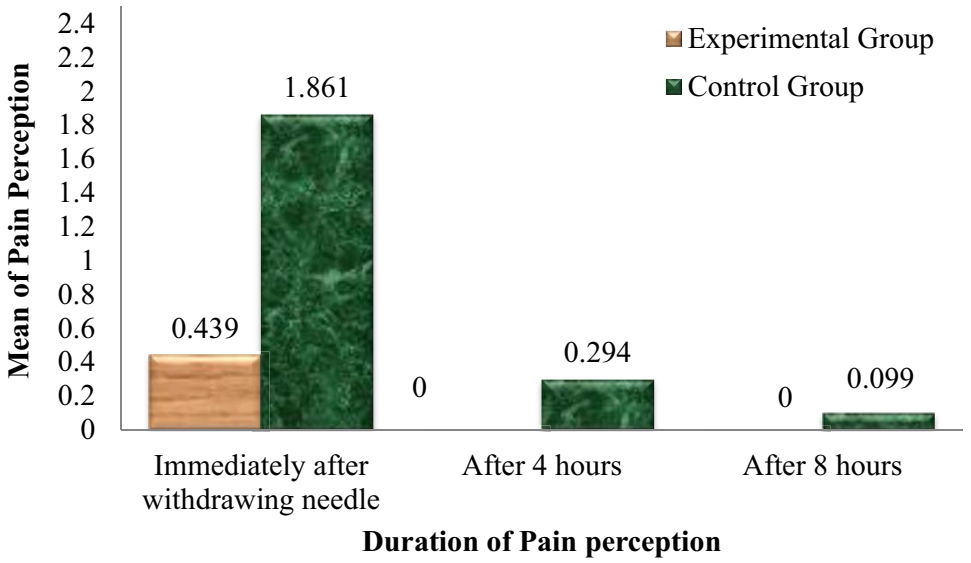
Level of pain perception was assessed immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 0.439 and 0.555 respectively and control group was 1.861 and 2.155 respectively with the mean difference of 1.422. Calculated ‘t’ value was

2.205, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Pain perception assessed after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group 0.294 and 0.359 respectively with the mean difference of 0.294. Calculated 't' value was 2.827, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Pain perception assessed after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and the control group was 0.099 and 0.119 respectively with the mean difference of 0.099. Calculated 't' value was 2.912, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH in immediately after withdrawing needle, after 4 hours and after 8 hours in the experimental and control group. (Figure 4.5.2)

Thus the research hypothesis, **H_1:** There will be a significant difference in the level of pain perception between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin is accepted.

Figure 4.5.2

Effect of Dry Cold Application on Pain Perception among Patients receiving LMWH in the Experimental Group and Control Group



Section VI

4.6 Effect of Dry Cold Application on Ecchymosis among Patients receiving LMWH in the Experimental Group and Control Group

This section deals with the analysis and interpretation on effect of dry cold application on ecchymosis among patients receiving low molecular weight heparin. In right upper outer arm, left upper outer arm, right thigh and left thigh, the ecchymosis was assessed 48 hours and 72 hours after the day of injection by using transparent ruler scale.

Table 4.6.1

Comparison on the Effect of Dry Cold Application on Ecchymosis among Patients receiving Low Molecular Weight Heparin in Experimental Group and Control Group

Ecchymosis		Group	Mean (cm^2)	SD	Mean difference	't' value
Site	**Hours**					
Right Upper Outer Arm	48 hours	Experimental Group	0.005	0	0.324	2.769*
		Control Group	0.329	0.402		
	72 hours	Experimental Group	0.003	0	0.512	2.498*
		Control Group	0.515	0.711		
Left Upper Outer Arm	48 hours	Experimental Group	0.007	0	0.324	2.189*
		Control Group	0.331	0.511		
	72 hours	Experimental Group	0.003	0	0.549	2.589*
		Control Group	0.552	0.736		
Right Thigh	48 hours	Experimental Group	0.009	0	0.11	3.667*
		Control Group	0.119	0.105		
	72 hours	Experimental Group	0.005	0.009	0.155	2.87*
		Control Group	0.16	0.185		
Left Thigh	48 hours	Experimental Group	0.008	0.009	0.038	2.11*
		Control Group	0.046	0.061		
	72 hours	Experimental Group	0.004	0	0.08	2.857*
		Control Group	0.084	0.099		

*Significant at 0.05 level

Unpaired ‘t’ test was used to compare the effect of dry cold application on ecchymosis among patients receiving LMWH in the experimental group and control groups.

Ecchymosis was assessed in right upper outer arm, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of

experimental group was 0.005 and 0 and control group was 0.329 and 0.402 respectively with the mean difference of 0.324, and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.003 and 0 and, control group was 0.515 and 0.711 respectively with the mean difference of 0.512. Calculated 't' value 48 hours and 72 hours after the day of injection were 2.769 and 2.498 respectively, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH on right upper outer arm, 48 hours and 72 hours after the day of injection. .

Ecchymosis was assessed in left upper outer arm, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.007 and 0 respectively, and control group was 0.331 and 0.511 respectively with the mean difference of 0.324, and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.003 and 0 respectively, control group was 0.552 and 0.736 respectively with the mean difference of 0.549. Calculated 't' value 48 hours and 72 hours after the day of injection were 2.189 and 2.589 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH on left upper outer arm, 48 hours and 72 hours after the day of injection.

Ecchymosis was assessed in right thigh, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.009 and 0 respectively and control group was 0.119 and 0.105 respectively with the mean difference of 0.11, and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.005 and 0.009 respectively and control group was 0.16 and 0.185 respectively with the mean difference of 0.155. Calculated 't' value 48 hours and 72 hours after the day of injection were 3.667 and 2.87 respectively, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH on right thigh, 48 hours and 72 hours after the day of injection.

Ecchymosis was assessed in left thigh, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.008 and 0.009 respectively, and control group was 0.046 and 0.061 respectively with the mean difference of 0.038 and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.004 and 0 respectively, and control group was 0.084 and 0.099 respectively with the mean difference of 0.08. Calculated 't' value 48 hours and 72 hours after the day of injection were 2.11 and 2.857, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH on left thigh, 48 hours and 72 hours after the day of injection. (Figure 4.6.1.1, Figure 4.6.1.2, Figure 4.6.1.3 and Figure 4.6.1.4)

Figure 4.6.1.1

Comparison on the Effect of Dry Cold Application on Ecchymosis among Patients receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm)

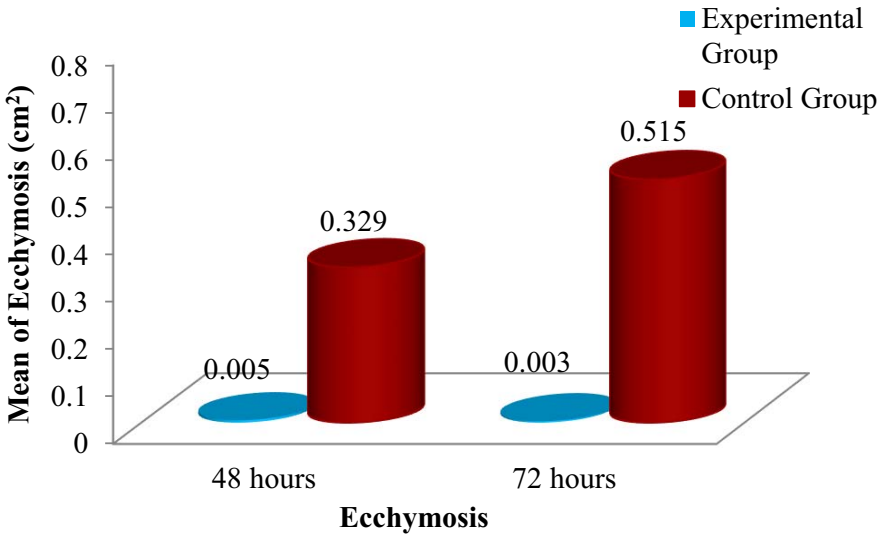


Figure 4.6.1.2

Comparison on the Effect of Dry Cold Application on Ecchymosis among Patients receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm)

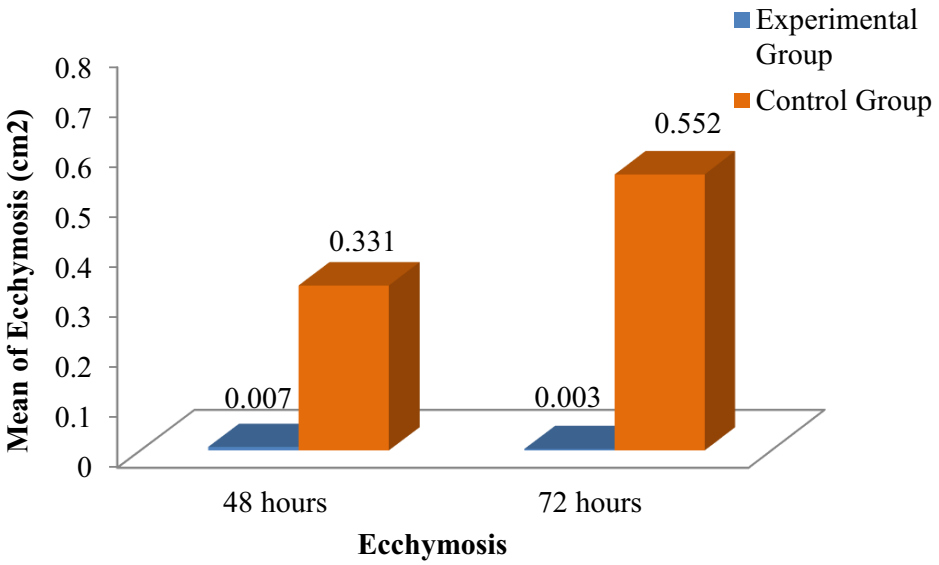


Figure 4.6.1.3

Comparison on the Effect of Dry Cold Application on Ecchymosis among Patients receiving LMWH in Experimental Group and Control Group (Right Thigh)

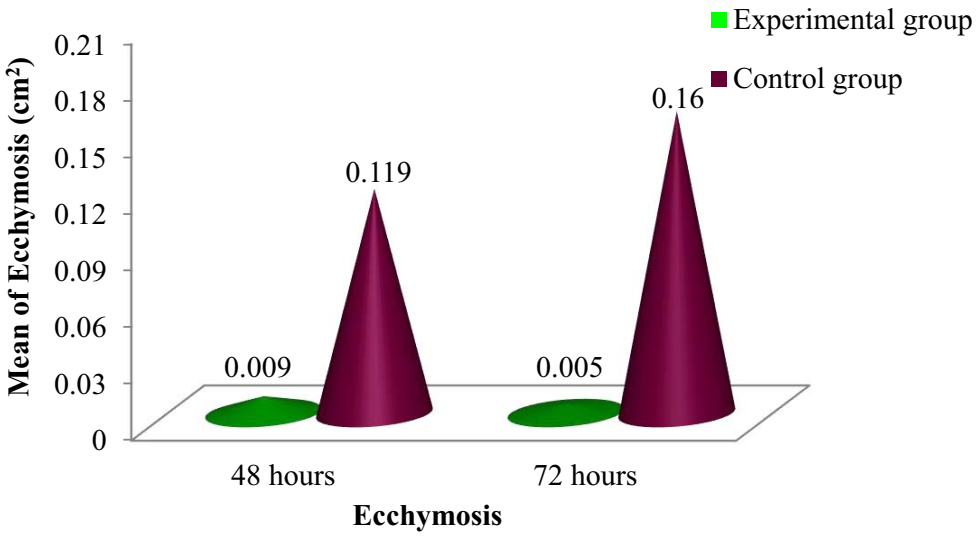


Figure 4.6.1.4

Comparison on the Effect of Dry Cold Application on Ecchymosis among Patients receiving LMWH in Experimental Group and Control Group (Left Thigh)

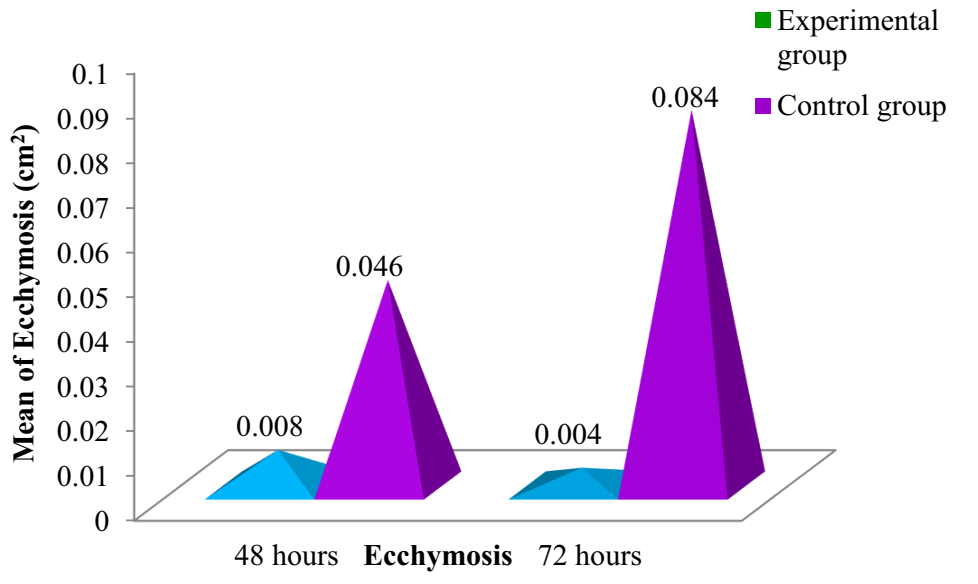


Table 4.6.2

Effect of Dry Cold Application on Ecchymosis among Patients Receiving Low Molecular Weight Heparin in the Experimental Group and Control Group

S. No	Ecchymosis	Group	Mean (cm^2)	SD	Mean difference	't' value
1.	48 hours	Experimental Group	0.003	0	0.066	2.129*
		Control Group	0.069	0.108		
2.	72 hours	Experimental Group	0.001	0	0.108	2.118*
		Control Group	0.109	0.175		

*Significant at 0.05 level

The above table 4.6.2 depicts the mean values in each site (right upper outer arm, left upper outer arm, right thigh and left thigh) of ecchymosis after 48 hours and 72 hours in the experimental and control group. Unpaired 't' test was used to analyze effect of dry cold application on ecchymosis among patients receiving LMWH in experimental and control groups.

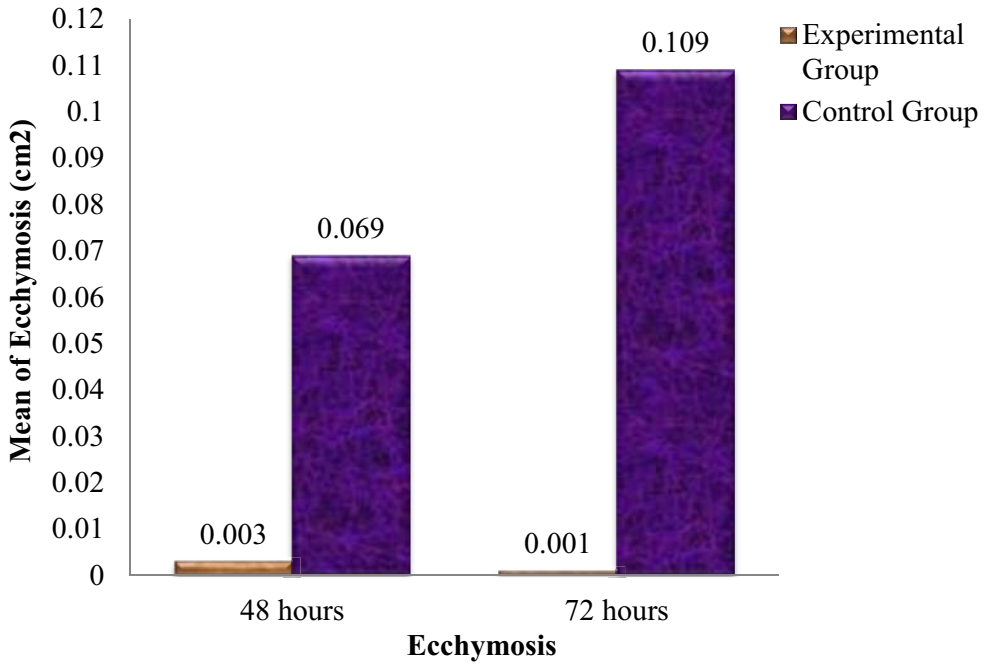
Size of ecchymosis was assessed 48 hours after the day of injection, it was identified that, the mean score and the standard deviation of experimental group was 0.003 and 0 respectively and control group was 0.069 and 0.108 respectively with the mean difference of 0.066. Calculated ‘t’ value was 2.129, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Ecchymosis assessed 72 hours after the day of injection, it was identified that, the mean score and the standard deviation of experimental group was 0.001 and 0 and control group was 0.109 and 0.175 respectively with the mean difference of 0.108. Calculated ‘t’ value was 2.118, which was greater than the table value

(t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH in 48 hours and 72 hours after the day of injection. (Figure 4.6.2)

Thus the research hypothesis **H_2**: There will be a significant difference in the size of ecchymosis between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin is accepted.

Figure 4.6.2

Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in the Experimental Group and Control Group



RESULTS AND DISCUSSION

This chapter deals with the results and discussion and findings. The aim of the study was to determine the effect of dry cold application on pain perception and ecchymosis among patients receiving low molecular weight heparin. The samples of the study were patients receiving injection low molecular weight heparin in Sri Ramakrishna Hospital. Total enumerative sampling technique was used to select the samples were randomly assigned to experimental group (n=13) and control group (n=12). For experimental group dry cold application was given for 3 minutes prior to administration of low molecular weight heparin. Injection LMWH was administered subcutaneously to the experimental group and control group. The level of pain perception was assessed by using numerical pain rating scale. The ecchymosis was assessed by using transparent ruler scale. The findings were discussed under the following headings.

5.1 Findings Related to Demographic Variables

The age of patients receiving low molecular weight heparin shows that in experimental group 9 (69.23%) patients were above 51 years, 3 (23.08%) patients were between the age group of 41 and 50 years, 1 (7.69%) patient was below 30 years and in the control group 8 (66.67%) patients were above 51 years, 2 (16.67%) patients were in the age group of 31 and 40 years, 1 (8.33%) patient was below 30 years and 41-50 years respectively.

The gender of patients receiving low molecular weight heparin shows that in the experimental group 10 (76.92%) patients were males, 3 (23.08%) patients were females, and in the control group 6 (50%) patients were males and females respectively.

The educational status of patients receiving low molecular weight heparin shows that in the experimental group, 3 (23.08%) patients had higher secondary education, 6 (46.15%) patients had high school education, 3 (23.08%) patients had primary school education and 1 (7.69%) patient was illiterate and in the control group 2 (16.67%) patients were graduates, 3 (25%) patients had higher secondary education, 5 (41.67%) patients had high school education, 1 (8.33%) patient had primary school education and 1 (8.33%) patient was illiterate.

The marital status of patients receiving low molecular weight heparin reveals that in the experimental group 11 (84.62%) patients were married, 1 (7.69%) patient was single and 1 (7.69%) patient was a widow and in the control group 9 (75%) patients were married, 2 (16.67%) patients were widows and 1 (8.33%) patient was single.

The religion of patients receiving low molecular weight heparin reveals that majority of patients, 13 (100%) in experimental group and 10 (83.33%) in control group belonged to Hindu religion

The occupation of patients receiving low molecular weight heparin shows that, in the experimental group 9 (69.23%) patients were employed, 4 (30.77%) were unemployed and in the control group 6 (50%) patients were employed and unemployed respectively.

5.2 Findings Related to Clinical Variables

The diagnosis of patients receiving low molecular weight heparin reveals that, in the experimental group 10 (76.92%) patients were the diagnosed with CVA, 2 (15.39%) patients were diagnosed with other diseases such as autoimmune encephalitis, seizure disorder and 1 (7.69%) patient was diagnosed with DVT and in the control group 8 (66.67%) patients were diagnosed with CVA, 2 (16.67%) patients were diagnosed with cerebro vascular thrombosis, 1(8.33%) patient was diagnosed with deep vein thrombosis, 1 (8.33%) patient was diagnosed with hepatoma.

The name of injection LMWH received by patients shows that in the experimental group 8 (61.53%) patients received Inj. Flothin 40 mg, 2 (15.39%) patients received Inj. Lupenox 40 mg, and Inj. Clexane 40 mg respectively, 1 (7.69%) patient received Inj. Enox 40 mg, and in the control group 8 (66.67%) patients received Inj. Flothin 40 mg, 2 (16.67%) patients received Inj. Enox 40 mg, 1 (8.33%) patient received Inj. Lupenox 40 mg, and Inj. Clexane 40 mg respectively.

The frequency of low molecular weight heparin received by patients shows that in the experimental and control group, 100% of patients received inj. LMWH twice a day.

Melba & Priyalatha (2009) conducted a study on the effectiveness of dry cold application on the occurrence of bruising and pain at the subcutaneous injection site of LMWH among 60 patients. The majority of patients were between the age of 51-60 years about 52 (86.7%) were males and 8 (13.3%) were females. The majority 32 (53.33%) received injection LMWH twice a day and 28 (46.67%) received injection LMWH once a day.

The patients receiving LMWH based on presence of any other illness reveals that in the experimental group 10 (76.92%) patients had other illness, 3 (23.08%) patients had no other illness and in the control group 6 (50%) patients had other illness, 6 (50%) patients had no other illness such as DM, SHT, CCF, IHD, CHF, CRF, PVD etc.

Batra (2014) conducted a study on the application of ice cube prior to subcutaneous injection of heparin in pain perception and ecchymosis of patients with cardiovascular problems. It was a quasi-experimental study posttest only control group design with 30 experimental group and 30 control group patients. The result shows, that in the experimental group 46.7% patients were 45-55 years of age. According to the gender, in experimental group majority 53.3% were males whereas in control group 76.7% patients were males. And the marital status, in experimental and control group 100% were married. According to the religion, in experimental group 70% and control group 80% patients belonged to Hindu religion. In experimental group 73.33% and control group 63.33% patients received 40 mg injection LMWH. In experimental group 33.3% and control group 36.7% patients were having hypertension and CAD.

5.3 Assessment on the Level of Pain Perception among Patients receiving Low Molecular Weight Heparin in the Experimental Group and Control Group

In this study 13 patients receiving dry cold application prior to administration of low molecular weight heparin and 12 patients not receiving dry cold application prior to administration of low molecular weight heparin were assessed for the level of pain perception experienced by using numerical pain rating scale.

The level of pain perception among patients receiving LMWH on right upper outer arm shows that in the experimental group immediately after withdrawing needle, 13 (100%) patients had mild pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in the control group immediately after withdrawing needle 8 (66.67%) patients had moderate pain and 4 (33.33%) had severe pain, after 4 hours 8 (66.67%) patients had mild pain, 4 (33.33 %) patients had no pain, and after 8 hours 6 (50%) patients had no pain and mild pain respectively.

The level of pain perception among patients receiving LMWH in left upper outer arm reveals that in experimental group immediately after withdrawing needle 12 (92.31%) patients had mild pain and 1 (7.69%) patient had moderate pain, after 4 hours and 8 hours 13 (100%) of patients had no pain respectively, whereas in control group immediately after withdrawing needle 8 (66.67%) patients had moderate pain and 3 (25%) patients had severe pain and 1 (8.33%) patient had unbearable pain, after 4 hours 10 (83.33%) patients had mild pain, 2 (16.67%) patients had no pain, and after 8 hours 7 (58.33%) patients had no pain, 5 (41.67%) patients had mild pain.

The level of pain perception among patients receiving LMWH in right thigh shows that in experimental group immediately after withdrawing needle 7 (53.85%) patients had mild pain, 5 (38.46%) patients had no pain, and 1 (7.69%) patient had moderate pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in control group immediately after withdrawing needle 10 (83.33%) patients had moderate pain and 2 (16.67%) patients had severe pain, after 4 hours 7 (58.33%) patients had mild pain, 5 (41.67 %) patients had no pain, and after 8 hours 9 (75%) patients had no pain, 3 (25%) patients had mild pain.

The level of pain perception among patients receiving LMWH in left thigh reveals that in experimental group immediately after withdrawing needle 8 (61.54%) patients had mild pain, 3 (23.08%) patients had no pain, and 2 (15.38%) patients had moderate pain, after 4 hours and 8 hours 13 (100%) patients had no pain respectively, whereas in control group immediately after withdrawing needle 6 (50%) patients had moderate pain and severe pain respectively, after 4 hours 10 (83.33%) patients had mild pain, 2 (16.67%) patients had no pain, and after 8 hours 7 (58.33%) patients had no pain, 5 (41.67%) patients had mild pain.

5.4 Assessment on the Size of Ecchymosis after Dry Cold Application among Patients receiving LMWH in Experimental Group and Control Group

The size of ecchymosis among patients receiving LMWH on right upper outer arm shows that in the experimental group, after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0- 0.5 cm^2, whereas in the control group after 48 hours, 9 (75%) patients had ecchymosis measuring 0-0.5 cm^2 ecchymosis, 2 (16.67%) patients had ecchymosis measuring 0.6 -1.0 cm^2 and 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and after 72 hours, 8 (66.67%) patients had ecchymosis measuring 0-0.5 cm^2, 2 (16.67%) patients had ecchymosis measuring 0.6 -1.0 cm^2 and 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and 2.6- 3.0 cm^2.

The size of ecchymosis among patients receiving LMWH on left upper outer arm shows that in the experimental group, after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0-0.5 cm^2, whereas in the control group after

48 hours, 10 (83.34%) patients had ecchymosis measuring 0-0.5 cm^2, 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and 1.6 -2.0 cm^2 respectively and after 72 hours 8 (66.67%) patients had ecchymosis measuring 0-0.5cm^2, 2 (16.67%) patients had ecchymosis measuring 0.6-1.0 cm^2 and 1 (8.33%) patient had ecchymosis measuring 1.1 -1.5 cm^2 and 2.6- 3.0 cm^2.

The ecchymosis among patients receiving LMWH on right and left thigh shows that in the experimental group and control group after 48 hours and 72 hours 13 (100%) patients had ecchymosis measuring 0- 0.5 cm^2.

5.5 Effect of Dry Cold Application on Pain Perception among Patients Receiving Low Molecular Weight Heparin in the Experimental and Control Group.

In this study 25 patients experimental group 13 patients and control group 12 patients were analyzed to evaluate the effect of dry cold application on pain perception among patients receiving low molecular weight. Unpaired 't' test was used to compare the effect of dry cold application on pain perception among patients receiving LMWH in experimental and control group.

The effect of dry cold application on pain perception in right upper outer arm, immediately after withdrawing needle, the mean score and standard deviation of experimental group was 1.462, 0.812 respectively, and control group was 5.359, 0.938 respectively with the mean difference of 3.897, after 4 hours, the mean score and standard deviation of experimental group was 0 and control group was 0.693 and 0.63 respectively with the mean difference of 0.693 and after 8 hours, the mean score

and standard deviation of experimental group was 0 and control group was 0.222 and 0.249 respectively with the mean difference of 0.222. Calculated 't' value immediately after withdrawing the needle, at 4 hours, and 8 hours were 10.667, 3.808 and 3.083 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

The effect of dry cold application on pain perception in left upper outer arm, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 1.667 and 0.995 respectively, and control group was 5.888 and 1.235 respectively with the mean difference of 4.221, and after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group was 0.916 and 0.708 respectively with the mean difference of 0.916, and after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group was 0.306 and 0.397 respectively with the mean difference of 0.306. Calculated 't' value immediately after withdrawing the needle, 4 hours, and 8 hours were 9.058, 4.468, and 2.684 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

The effect of dry cold application on pain in right thigh, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 1.231 and 1.137 respectively, and control group was 5.25 and 1.267 respectively with the mean difference of 4.019, and after 4 hours, it was identified that, the mean score and standard deviation of experimental group

was 0, and control group was 0.708 and 0.853 respectively with the mean difference of 0.708, and after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0, and control group was 0.375 and 0.582 respectively with the mean difference of 0.375. Calculated 't' value immediately after withdrawing the needle, 4 hours, and 8 hours were 8.023, 2.878, and 2.232 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

The effect of dry cold application on pain perception in left thigh, immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 1.346 and 1.182 respectively, and control group was 1.833 and 1.264 respectively with the mean difference of 4.487, and after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0, and control group was 1.208 and 0.802 respectively with the mean difference of 1.208, and 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0, and control group was 0.292 and 0.379 respectively with the mean difference of 0.292. Calculated 't' value immediately after withdrawing the needle, 4 hours, and 8 hours were 8.798, 5.207 and 2.679 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH on right upper outer arm, left upper outer arm, right thigh, and left thigh in immediately after withdrawing the needle, after 4 hours, and after 8 hours after dry cold application

Effect of dry cold application on level of pain perception immediately after withdrawing needle, it was identified that, the mean score and standard deviation of experimental group was 0.439 and 0.555 respectively and control group was 1.861 and 2.155 respectively with the mean difference of 1.422. Calculated 't' value was 2.205, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Pain perception assessed after 4 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and control group 0.294 and 0.359 respectively with the mean difference of 0.294. Calculated 't' value was 2.827, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Pain perception assessed after 8 hours, it was identified that, the mean score and standard deviation of experimental group was 0 and the control group was 0.099 and 0.119 respectively with the mean difference of 0.099. Calculated 't' value was 2.912, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

Hence it shows there is a significant difference in the level of pain perception among patients receiving LMWH in immediately after withdrawing the needle, after 4 hours, and after 8 hours after dry cold application. Thus the research hypothesis, H_1: There will be a significant difference in the level of pain perception between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin is accepted.

5.6 Effect of Dry Cold Application on Ecchymosis among Patients receiving Low Molecular Weight Heparin in the Experimental and Control Group.

Unpaired 't' test was used to compare the effect of dry cold application on ecchymosis among patients receiving LMWH in the experimental group and control groups.

Effect of dry cold application on ecchymosis in right upper outer arm, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.005 and 0 and control group was 0.329 and 0.402 respectively with the mean difference of 0.324, and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.003 and 0 and, control group was 0.515 and 0.711 respectively with the mean difference of 0.512. Calculated 't' value 48 hours and 72 hours after the day of injection were 2.769 and 2.498 respectively, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

Effect of dry cold application on ecchymosis in left upper outer arm, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.007 and 0 respectively, and control group was 0.331 and 0.511 respectively with the mean difference of 0.324, and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.003 and 0 respectively, control group was 0.552 and 0.736 respectively with the mean difference of 0.549. Calculated 't' value 48 hours and 72 hours after the day of injection were 2.189 and 2.589 respectively which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

Effect of dry cold application on ecchymosis in right thigh, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.009 and 0 respectively and control group was 0.119 and 0.105 respectively with the mean difference of 0.11, and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.005 and 0.009 respectively and control group was 0.16 and 0.185 respectively with the mean difference of 0.155. Calculated 't' value 48 hours and 72 hours after the day of injection were 3.667 and 2.87 respectively, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance.

Effect of dry cold application on ecchymosis in left thigh, 48 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.008 and 0.009 respectively, and control group was 0.046 and 0.061 respectively with the mean difference of 0.038 and 72 hours after the day of injection, it was identified that, the mean score and standard deviation of experimental group was 0.004 and 0 respectively, and control group was 0.084 and 0.099 respectively with the mean difference of 0.08. Calculated 't' value 48 hours and 72 hours after the day of injection were 2.11 and 2.857, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH on left thigh, 48 hours and 72 hours after the day of injection.

Hence it shows there is a significant difference in the size of ecchymosis between the experimental and control group patients, on right upper outer arm, left upper outer arm, right thigh, and left thigh, at 48 hours, 72 hours after dry cold application.

Effect of dry cold application on ecchymosis, 48 hours after the day of injection, it was identified that, the mean score and the standard deviation of experimental group was 0.003 and 0 respectively and control group was 0.069 and 0.108 respectively with the mean difference of 0.066. Calculated 't' value was 2.129, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Ecchymosis assessed 72 hours after the day of injection, it was identified that, the mean score and the standard deviation of experimental group was 0.001 and 0 and control group was 0.109 and 0.175 respectively with the mean difference of 0.108. Calculated 't' value was 2.118, which was greater than the table value (t_v= 2.07, df=23) at 0.05 level of significance. Hence it shows there is a significant difference in the size of ecchymosis among patients receiving LMWH in 48hours and 72 hours after the day of injection. Thus the research hypothesis H_2: There will be a significant difference in the size of ecchymosis between the experimental group and control group after dry cold application among patients receiving low molecular weight heparin is accepted.

ANNEXURE I

Analysis on the Effect of Dry Cold Application on Pain Perception and Ecchymosis in the Experimental and Control Group

Unpaired 't' test was used to analyze the effect of dry cold application on Pain Perception and Ecchymosis in the experimental and control group

$$t = \frac{\overline{x_1} - \overline{x_2}}{SE}$$

Where,

$$\text{SE (Standard Error)} = \text{SD} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$\text{SD (Combined standard deviation)} = \sqrt{\frac{\sum \left(x_1 - \overline{x_1}\right)^2 + \sum \left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}}$$

$\overline{X}_1$ = Mean of the experimental group

$\overline{X}_2$ = Mean of the control group post

n_1 = Number of samples in experimental group

n_2 = Number of samples in control group

ANNEXURE 1.1

Analysis on Effect of Dry Cold Application on Pain Perception among Patients Receiving Low Molecular Weight Heparin in Experimental Group and Control Group

1.1.1 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm) Immediately after Withdrawing the Needle

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	1.33	-0.132	0.017	6.33	0.971	0.943
2.	1	-0.462	0.213	6.33	0.971	0.943
3.	1.33	-0.132	0.017	6.33	0.971	0.943
4.	1.67	0.208	0.043	3.33	-2.029	4.117
5.	2.33	0.868	0.753	6	0.641	0.411
6.	1.67	0.208	0.043	4.33	-1.029	1.059
7.	2.67	1.208	1.459	6	0.641	0.411
8.	0.33	-1.132	1.281	5.33	-0.029	0.001
9.	0.67	-0.792	0.627	5	-0.359	0.129
10.	2.33	0.87	0.757	6	0.641	0.411
11.	0.33	-1.132	1.281	4.33	-1.029	1.059
12.	2.67	1.208	1.459	5	-0.359	0.129
13.	0.67	-0.792	0.627			
	19		8.577	64.31		10.556

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{8.577+10.556}{13+12-2}} = 0.912$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.912\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.365$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{1.462 - 5.359}{0.365} = 10.677$$

$$\boxed{t = 10.677}$$

1.1.2 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm) After 4 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	1.33	0.637	0.406
2.	0	0	0	1.33	0.637	0.406
3.	0	0	0	1.67	0.977	0.955
4.	0	0	0	0	-0.693	0.48
5.	0	0	0	1.33	0.637	0.406
6.	0	0	0	0	-0.693	0.48
7.	0	0	0	0	-0.693	0.48
8.	0	0	0	0.33	-0.363	0.132
9.	0	0	0	0.33	-0.363	0.132
10.	0	0	0	1.33	0.637	0.406
11.	0	0	0	0	-0.693	0.48
12.	0	0	0	0.67	-0.023	0.001
13.	0	0	0			
	0		0	8.32		4.764

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+4.764}{13+12-2}} = 0.455$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.352\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.182$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.693}{0.182} = 3.808$$

t = 3.808

1.1.3 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm) After 8 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0	-0.222	0.049
2.	0	0	0	0.33	0.108	0.012
3.	0	0	0	0.33	0.108	0.012
4.	0	0	0	0	-0.222	0.049
5.	0	0	0	0.67	0.448	0.201
6.	0	0	0	0	-0.222	0.049
7.	0	0	0	0	-0.222	0.049
8.	0	0	0	0	-0.222	0.049
9.	0	0	0	0.33	-20.3	0.012
10.	0	0	0	0.33	0.108	0.012
11.	0	0	0	0	0.108	0.049
12.	0	0	0	0.67	-0.222	0.201
13.	0	0	0		0.448	
	0		0	2.66		0.744

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+0.744}{13+12-2}} = 0.179$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.179\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.072$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.222}{0.072} = 3.083$$

t = 3.083

1.1.4 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm) Immediately after Withdrawing the Needle

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	2.33	0.633	0.439	5.33	-0.558	0.311
2.	2	0.333	0.111	4.33	-1.558	2.427
3.	0.67	-0.997	0.994	6.33	0.442	0.195
4.	2	0.333	0.111	4.67	-1.218	1.484
5.	3	1.333	1.777	6.67	0.782	0.612
6.	3.67	2.003	4.012	5.67	-0.218	0.048
7.	2.33	0.663	0.439	8.33	2.442	5.963
8.	0.33	-1.337	1.787	8	2.112	4.461
9.	0.67	-0.997	0.994	6	0.112	0.013
10.	2	0.333	0.111	5.67	-0.218	0.048
11.	0.67	-0.997	0.994	5.33	-0.558	0.311
12.	0.67	-0.997	0.994	4.33	-1.558	2.427
13.	1.33	-0.337	0.114			
	21.67		12.877	70.66		18.3

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{12.877 + 18.3}{13 + 12 - 2}} = 1.164$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 1.164\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.466$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{1.667 - 5.888}{0.466} = 9.058$$

$$\boxed{t = 9.058}$$

1.1.5 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm) After 4 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0.33	-0.586	0.343
2.	0	0	0	0	-0.916	0.839
3.	0	0	0	0.33	-0.586	0.343
4.	0	0	0	1	0.084	0.007
5.	0	0	0	1.33	0.414	0.171
6.	0	0	0	1	0.084	0.007
7.	0	0	0	2	1.084	1.175
8.	0	0	0	2.33	1.414	1.999
9.	0	0	0	1.33	0.414	0.171
10.	0	0	0	0.67	-0.246	0.061
11.	0	0	0	0.67	-0.246	0.061
12.	0	0	0	0	-0.916	0.839
13.	0	0	0			
	0		0	10.99		6.016

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+6.016}{13+12-2}} = 0.512$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.512\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.205$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.916}{0.205} = 4.468$$

$$t = 4.468$$

1.1.6 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm) After 8 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0	-0.306	0.094
2.	0	0	0	0	-0.306	0.094
3.	0	0	0	0.33	0.024	0.001
4.	0	0	0	0	-0.306	0.094
5.	0	0	0	0	-0.306	0.094
6.	0	0	0	0.67	-0.364	0.132
7.	0	0	0	1	-0.694	0.482
8.	0	0	0	1	-0.694	0.482
9.	0	0	0	0	-0.306	0.094
10.	0	0	0	0	-0.306	0.094
11.	0	0	0	0.67	0.364	0.132
12.	0	0	0	0	-0.306	0.094
13.	0	0	0			
	0		0	3.67		1.887

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+1.887}{13+12-2}} = 0.286$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.286\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.114$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.306}{0.114} = 2.684$$

t = 2.684

1.1.7 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Right Thigh) Immediately after Withdrawing the Needle

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	1.5	0.269	0.072	3.5	-1.75	3.061
2.	0	-1.231	1.515	5	-0.25	0.063
3.	1.5	0.269	0.072	5.5	0.25	0.063
4.	2	0.769	0.591	4	-1.25	1.563
5.	1.5	0.269	0.072	8.5	3.25	10.563
6.	2.5	1.269	1.61	4	-1.25	1.563
7.	2.5	1.269	1.61	5	-0.25	0.063
8.	0	-1.231	1.515	6.5	1.25	1.563
9.	1	-0.231	0.053	4.5	-0.75	0.563
10.	3.5	2.269	5.148	5.5	0.25	0.063
11.	0	-1.231	1.515	5.5	0.25	0.063
12.	0	-1.231	1.515	5.5	0.25	0.063
13.	0	-1.231	1.515			
	16		16.803	63		19.254

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{16.803 + 19.254}{13 + 12 - 2}} = 1.252$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 1.164\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.501$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{1.231 - 5.25}{0.501} = 8.023$$

t = 8.023

1.1.8 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Right Thigh) After 4 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0	-0.708	0.501
2.	0	0	0	0.5	-0.208	0.043
3.	0	0	0	0	-0.708	0.501
4.	0	0	0	0.5	-0.208	0.043
5.	0	0	0	3	2.292	5.253
6.	0	0	0	0	-0.708	0.501
7.	0	0	0	0	-0.708	0.501
8.	0	0	0	1	0.292	0.085
9.	0	0	0	0	-0.708	0.501
10.	0	0	0	1	0.292	0.085
11.	0	0	0	1	0.292	0.085
12.	0	0	0	1.5	0.792	0.627
13.	0	0	0			
	0		0	8.5		8.726

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+8.726}{13+12-2}} = 0.616$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.616\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.246$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.708}{0.246} = 2.878$$

$$\boxed{t = 2.878}$$

1.1.9 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Right Thigh) After 8 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0	-0.375	0.141
2.	0	0	0	0	-0.375	0.141
3.	0	0	0	0	-0.375	0.141
4.	0	0	0	0	-0.375	0.141
5.	0	0	0	2	1.625	2.641
6.	0	0	0	0	-0.375	0.141
7.	0	0	0	0	-0.375	0.141
8.	0	0	0	0.5	0.125	0.016
9.	0	0	0	0	-0.375	0.141
10.	0	0	0	0.5	0.125	0.016
11.	0	0	0	0.5	0.125	0.016
12.	0	0	0	1	0.625	0.391
13.	0	0	0			
	0		0	4.5		4.067

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+4.067}{13+12-2}} = 0.42$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.42\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.168$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.375}{0.168} = 2.232$$

t = 2.232

1.1.10 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Left Thigh) Immediately after Withdrawing the Needle

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	2	0.654	0.428	7.5	1.667	2.779
2.	3.5	2.154	4.639	5	-0.833	0.694
3.	0	-1.346	1.812	4.5	-1.333	1.777
4.	0.5	-0.846	0.716	4	-1.833	3.359
5.	1.5	0.154	0.024	7.5	1.667	2.779
6.	0	-1.346	1.812	4	-1.833	3.359
7.	3.5	2.154	4.639	5.5	-0.333	0.111
8.	0	-1.346	1.812	6.5	0.667	0.445
9.	1	-0.346	0.119	6.5	0.667	0.445
10.	2.5	1.154	1.332	7	1.167	1.362
11.	1.5	0.154	0.024	7	1.167	1.362
12.	0.5	-0.846	0.716	5	-0.833	0.694
13.	1	-0.346	0.119			
	17.5		18.192	70		19.166

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{18.192 + 19.166}{13 + 12 - 2}} = 1.275$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 1.275\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.51$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{1.346 - 5.833}{0.51} = 8.798$$

$$\boxed{t = 8.798}$$

1.1.11 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Left Thigh) After 4 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	2.5	1.292	1.669
2.	0	0	0	0	-1.208	1.459
3.	0	0	0	0.5	-0.708	0.501
4.	0	0	0	0.5	-0.708	0.501
5.	0	0	0	1.5	0.292	0.085
6.	0	0	0	1	-0.208	0.043
7.	0	0	0	1	-0.208	0.043
8.	0	0	0	2	0.792	0.627
9.	0	0	0	2	0.792	0.627
10.	0	0	0	2	0.792	0.627
11.	0	0	0	1.5	0.292	0.085
12.	0	0	0	0	-1.208	1.459
13.	0	0	0			
	0		0	14.5		7.726

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+7.726}{13+12-2}} = 0.579$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.579\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.232$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 1.208}{0.232} = 5.207$$

t = 5.207

1.1.12 Effect of Dry Cold Application on Pain Perception among Patients Receiving LMWH in Experimental Group and Control Group (Left Thigh) After 8 hours

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	1	0.708	0.501
2.	0	0	0	0	-0.292	0.085
3.	0	0	0	0	-0.292	0.085
4.	0	0	0	0	-0.292	0.085
5.	0	0	0	0	-0.292	0.085
6.	0	0	0	0	-0.292	0.085
7.	0	0	0	0.5	0.208	0.043
8.	0	0	0	1	0.708	0.501
9.	0	0	0	0.5	0.208	0.043
10.	0	0	0	0	-0.292	0.085
11.	0	0	0	0.5	0.208	0.043
12.	0	0	0	0	-0.292	0.085
13.	0	0	0			
	0		0	3.5		1.726

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+1.726}{13+12-2}} = 0.274$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.274\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.109$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.292}{0.109} = 2.679$$

$$\boxed{t = 2.679}$$

ANNEXURE 1.2

Analysis on Effect of Dry Cold Application on Pain Perception among Patients Receiving Low Molecular Weight Heparin in Experimental Group and Control Group

1.2.1 Effect of Dry Cold Application on Pain Perception Immediately after Withdrawing the Needle among Patients Receiving LMWH in Experimental Group and Control Group

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	1.462	1.023	1.047	5.359	3.498	12.236
2.	1.667	1.228	1.508	5.888	4.027	16.217
3.	1.231	0.792	0.627	5.25	3.389	11.485
4.	1.346	0.907	0.823	5.833	3.972	15.777
	5.706		4.005	22.33		55.715

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{4.005 + 55.715}{13 + 12 - 2}} = 1.612$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 1.612\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.645$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.439 - 1.861}{0.645} = 2.205$$

$$\boxed{t = 2.205}$$

1.2.2 Effect of Dry Cold Application on Pain Perception after 4 hours among Patients Receiving LMWH in Experimental Group and Control Group

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0.693	0.399	0.159
2.	0	0	0	0.916	0.622	0.387
3.	0	0	0	0.708	0.414	0.171
4.	0	0	0	1.208	0.914	0.835
	0	0	0	3.525		1.552

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+1.552}{13+12-2}} = 0.261$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.261\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.104$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0. - 0.294}{0.104} = 2.827$$

$$\boxed{t = 2.827}$$

1.2.3 Effect of Dry Cold Application on Pain Perception after 8 hours among Patients Receiving LMWH in Experimental Group and Control Group

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0.222	0.123	0.015
2.	0	0	0	0.306	0.207	0.043
3.	0	0	0	0.375	0.276	0.076
4.	0	0	0	0.292	0.193	0.037
	0	0	0	1.195		0.171

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+0.171}{13+12-2}} = 0.084$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.084\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.034$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0 - 0.099}{0.034} = 2.912$$

$$\boxed{t = 2.912}$$

ANNEXURE 2.1

Analysis on Effect of Dry Cold Application on Ecchymosis among Patients Receiving Low Molecular Weight Heparin in Experimental Group and Control Group

2.1.1 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm) 48 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	-0.005	0	0.025	-0.304	0.092
2.	0	-0.005	0	0.025	-0.304	0.092
3.	0	-0.005	0	1.42	1.091	1.19
4.	0.02	0.015	0	0.01	-0.319	0.102
5.	0	-0.005	0	0.355	0.026	0.001
6.	0	-0.005	0	0.8	0.471	0.222
7.	0.02	0.015	0	0.105	-0.224	0.05
8.	0.005	0	0	0.15	-0.179	0.032
9.	0	-0.005	0	0.6	0.271	0.073
10.	0.01	0.005	0	0.18	-0.149	0.022
11.	0	-0.005	0	0.15	-0.179	0.032
12.	0.005	0	0	0.138	-0.191	0.036
13.	0.005	0	0			
	0.065		0	3.958		1.944

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+1.944}{13+12-2}} = 0.292$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.292\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.117$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.005 - 0.329}{0.117} = 2.769$$

$$\boxed{t = 2.769}$$

2.1.2 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Right Upper Outer Arm) 72 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	-0.003	0	0.06	-0.455	0.207
2.	0	-0.003	0	0.05	-0.465	0.216
3.	0	-0.003	0	2.6	2.085	4.347
4.	0.005	0.002	0	0.07	-0.445	0.198
5.	0	-0.003	0	0.52	0.005	0
6.	0	-0.003	0	1.175	0.66	0.436
7.	0.01	0.007	0	0.025	-0.49	0.24
8.	0.005	0.002	0	0.325	-0.19	0.036
9.	0	-0.003	0	0.765	0.25	0.063
10.	0.005	0.002	0	0.105	-0.41	0.168
11.	0	-0.003	0	0.275	-0.24	0.058
12.	0.005	0.002	0	0.215	-0.3	0.09
13.	0.005	0.002	0			
	0.035		0	6.185		6.059

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+6.059}{13+12-2}} = 0.513$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.513\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.205$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.003 - 0.515}{0.205} = 2.498$$

$$\boxed{t = 2.498}$$

2.1.3 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm) 48 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0.01	-0.003	0	0.025	-0.306	0.094
2.	0.01	-0.003	0	0.43	0.099	0.009
3.	0.01	-0.003	0	1.7	1.369	1.874
4.	0	-0.007	0	0.055	-0.276	0.076
5.	0.005	-0.002	0	0.08	-0.251	0.063
6.	0	-0.003	0	0.06	-0.271	0.073
7.	0.01	-0.003	0	0.025	-0.306	0.094
8.	0.02	0.013	0	0.043	-0.288	0.083
9.	0	-0.007	0	1.125	0.794	0.63
10.	0.01	-0.003	0	0.288	-0.043	0.002
11.	0.01	-0.003	0	0.058	-0.273	0.075
12.	0	-0.007	0	0.085	-0.246	0.061
13.	0	-0.007	0			
	0.085		0	3.974		3.134

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+3.134}{13+12-2}} = 0.369$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.369\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.148$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.007 - 0.331}{0.148} = 2.189$$

$$\boxed{t = 2.189}$$

2.1.4 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Left Upper Outer Arm) 72 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0.005	0.002	0	0.035	-0.517	0.267
2.	0.005	0.002	0	0.575	0.023	0.001
3.	0	-0.003	0	2.625	2.073	4.297
4.	0	-0.003	0	0.255	-0.297	0.088
5.	0	-0.003	0	0.17	-0.382	0.146
6.	0	-0.003	0	0.08	-0.472	0.223
7.	0.005	0.002	0	0.045	-0.507	0.257
8.	0.02	0.017	0	0.275	-0.277	0.077
9.	0	-0.003	0	1.5	0.948	0.899
10.	0	-0.003	0	0.45	-0.102	0.01
11.	0	-0.003	0	0.53	-0.022	0.001
12.	0	-0.003	0	0.08	-0.472	0.223
13.	0	-0.003	0			
	0.035		0	6.62		6.489

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+6.489}{13+12-2}} = 0.531$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.531\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.212$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.003 - 0.552}{0.212} = 2.589$$

$$t = 2.589$$

2.1.5 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Right Thigh) 48 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	-0.009	0	0.02	-0.099	0.009
2.	0	-0.009	0	0.25	0.131	0.017
3.	0	-0.009	0	0.09	-0.029	0.001
4.	0.01	0.001	0	0.35	0.231	0.053
5.	0	-0.009	0	0.02	-0.099	0.009
6.	0.06	0.051	0	0.04	-0.079	0.006
7.	0	-0.009	0	0.09	-0.029	0.001
8.	0	-0.009	0	0.0875	-0.0315	0.001
9.	0	-0.009	0	0.01	-0.109	0.012
10.	0	-0.009	0	0.04	-0.079	0.006
11.	0	-0.009	0	0.225	0.106	0.011
12.	0.015	0.006	0	0.2	0.081	0.007
13.	0.04	0.031	0.001			
	0.125		0.001	1.4225		0.133

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0.001+0.133}{13+12-2}} = 0.076$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.076\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.03$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.009 - 0.119}{0.03} = 3.667$$

$$\boxed{t = 3.667}$$

2.1.6 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Right Thigh) 72 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	-0.005	0	0.04	-0.12	0.014
2.	0	-0.005	0	0.3	0.14	0.019
3.	0	-0.005	0	0.04	-0.12	0.014
4.	0.01	0.005	0	0.7	0.54	0.292
5.	0	-0.005	0	0.02	-0.14	0.019
6.	0.04	0.035	0.001	0.09	-0.07	0.005
7.	0	-0.005	0	0.09	-0.07	0.005
8.	0	-0.005	0	0.105	-0.055	0.003
9.	0	-0.005	0	0.01	-0.15	0.023
10.	0	-0.005	0	0.075	-0.085	0.007
11.	0	-0.005	0	0.25	0.09	0.008
12.	0.01	0.005	0	0.2	0.04	0.002
13.	0.01	0.005	0			
	0.07		0.001	1.92		0.411

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0.001+0.411}{13+12-2}} = 0.134$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.134\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.054$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.005 - 0.16}{0.054} = 2.87$$

$$\boxed{t = 2.87}$$

2.1.7 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Left Thigh) 48 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	-0.008	0	0.015	-0.031	0.001
2.	0	-0.008	0	0.04	-0.006	0
3.	0	-0.008	0	0.01	-0.036	0.001
4.	0.01	0.002	0	0.0225	-0.0235	0.001
5.	0	-0.008	0	0.01	-0.036	0.001
6.	0.02	0.012	0	0.2	0.154	0.024
7.	0	-0.008	0	0.01	-0.036	0.001
8.	0.04	0.032	0.001	0.0225	-0.0235	0.001
9.	0	-0.008	0	0.01	-0.036	0.001
10.	0.01	0.002	0	0.015	-0.031	0.001
11.	0	-0.008	0	0.16	0.114	0.013
12.	0.015	0.007	0	0.04	-0.006	0
13.	0.01	0.002	0			
	0.105		0.001	0.555		0.045

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0.001+0.045}{13+12-2}} = 0.045$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.045\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.018$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.008 - 0.046}{0.018} = 2.11$$

t = 2.11

2.1.8 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group (Left Thigh) 72 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	-0.004	0	0.03	-0.054	0.003
2.	0	-0.004	0	0.09	0.006	0
3.	0	-0.004	0	0.01	-0.074	0.005
4.	0.01	0.006	0	0.03	-0.054	0.003
5.	0	-0.004	0	0.015	-0.069	0.005
6.	0.02	0.016	0	0.36	0.276	0.076
7.	0	-0.004	0	0.04	-0.044	0.002
8.	0.01	0.006	0	0.04	-0.044	0.002
9.	0	-0.004	0	0.075	-0.009	0
10.	0	-0.004	0	0.04	-0.044	0.002
11.	0	-0.004	0	0.2	0.116	0.014
12.	0	-0.004	0	0.075	-0.009	0
13.	0.01	0.006	0			
	0.05		0	1.005		0.112

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+0.112}{13+12-2}} = 0.071$$

$$SE = SD\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} = 0.071\sqrt{\frac{1}{13}+\frac{1}{12}} = 0.028$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.004 - 0.084}{0.028} = 2.857$$

$$\boxed{t = 2.857}$$

ANNEXURE 2.2

Analysis on Effect of Dry Cold Application on Ecchymosis among Patients Receiving Low Molecular Weight Heparin in Experimental Group and Control Group

2.2.1 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group 48 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0.005	0.002	0	0.33	0.261	0.068
2.	0.02	0.017	0	0.331	0.262	0.069
3.	0.009	0.006	0	0.119	0.05	0.003
4.	0.008	0.005	0	0.046	-0.023	0.001
	0.042		0	0.826		0.141

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+0.141}{13+12-2}} = 0.078$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.078\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.031$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.003 - 0.069}{0.031} = 2.129$$

$$\boxed{t = 2.129}$$

2.2.2 Effect of Dry Cold Application on Ecchymosis among Patients Receiving LMWH in Experimental Group and Control Group Ecchymosis 72 hours after the day of injection

S. No	Experimental Group			Control Group		
	x_1	$x_1 - \overline{x_1} = D_1$	D_1^2	x_2	$x_2 - \overline{x_2} = D_2$	D_2^2
1.	0	0	0	0.516	0.407	0.166
2.	0	0	0	0.552	0.443	0.196
3.	0	0	0	0.16	0.051	0.003
4.	0	0	0	0.084	-0.025	0.001
	0		0	1.312		0.366

$$SD = \sqrt{\frac{\sum\left(x_1 - \overline{x_1}\right)^2 + \sum\left(x_2 - \overline{x_2}\right)^2}{n_1 + n_2 - 2}} = \sqrt{\frac{0+0.366}{13+12-2}} = 0.127$$

$$SE = SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 0.127\sqrt{\frac{1}{13} + \frac{1}{12}} = 0.051$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{0.001 - 0.109}{0.051} = 2.118$$

$$\boxed{t = 2.118}$$

ANNEXURE 3.1

Content Validity of the Tool

S. No	ITEM	EXPERT							NUMBER OF AGREEMENT	I-CVI
		1	2	3	4	5	6	7		
	Section A Demographic Variables									
1.	Age	3	4	4	3	4	3	4	7	0.98
2.	Gender	3	4	4	4	4	3	4	7	0.98
3.	Educational Status	3	4	4	4	4	3	4	7	0.98
4.	Marital Status	3	4	4	4	4	3	4	7	0.98
5.	Religion	2	4	4	4	4	3	4	7	0.98
6.	Occupation	2	4	4	4	4	3	4	7	0.98
	Section B Clinical Variables									
1.	Diagnosis	3	4	3	4	4	3	4	7	0.98
2.	Name of the injection and dose	4	4	3	4	4	3	4	7	0.98
3.	Frequency of Inj. LMWH	4	4	4	4	3	3	4	7	0.98
4.	Any other illness	4	4	4	4	2	3	4	7	0.98
1.	**Section C** Numerical pain rating scale	4	4	4	4	4	3	4	7	0.98
1.	**Section D** Transparent ruler scale	4	4	4	3	4	3	4	7	0.98

CONTROL GROUP
ECCHYMOSIS AFTER 48 HOURS OF LMWH INJECTION

ECCHYMOSIS AFTER 72 HOURS OF LMWH INJECTION

EXPERIMENTAL GROUP
EFFECT OF DRY COLD APPLICATION ON ECCHYMOSIS AFTER 48 HOURS OF LMWH INJECTION

EFFECT OF DRY COLD APPLICATION ON ECCHYMOSIS AFTER 72 HOURS OF LMWH INJECTION